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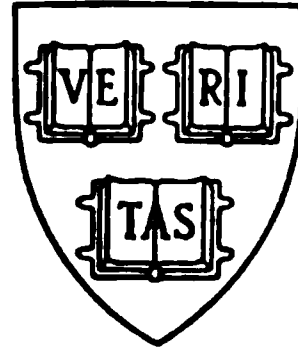
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ANNUAL
OF THE
UNIVERSAL MEDICAL SCIENCES

**A YEARLY REPORT OF THE PROGRESS OF THE GENERAL
SANITARY SCIENCES THROUGHOUT THE WORLD.**

EDITED BY
CHARLES E. SAJOUS, M. D.,
AND
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SURGERY OF THE BRAIN, SPINAL CORD, AND NERVES.

By JOHN H. PACKARD, A.M., M.D.,

PHILADELPHIA.

CEREBRAL SURGERY.

“BRAIN SURGERY from a Medical Stand-point” is the subject of a notable article by Sahli.⁴⁰⁴_{July} The author condemns Horsley’s ideas of ligation of the carotid artery in spontaneous cerebral hæmorrhage and of trephining in obstinate cephalalgia. He regards exploratory trephining as a measure to be employed with caution. He thinks only a small proportion of brain-tumors are susceptible of extirpation; the time for interference should be decided in each case by the condition of the patient and the site of the growth. He regards cerebral gummata as demanding medical rather than surgical treatment. Abscesses of the brain, in the author’s opinion, offer a favorable field for surgery. Operations answer better in cortical epilepsy than in other forms, but have not always afforded good results. This subject, however, may take a different aspect with more accurate knowledge of the originating areas derived from careful clinical study, and with further experience in the use of electricity in localizing the centres. Operations for the relief of pressure symptoms, even from incurable lesions, are justifiable,—as, for example, in cases of cerebral tumors or in tubercular meningitis. The trephine is to be preferred to the chisel for entering the cranium, on account of the concussion inseparable from the use of the latter instrument. In the present state of science, nothing can be expected in the treatment of the insane by surgical means.

A series of articles by Laurent,²⁷⁶_{Mar. 30 et seq.} forming a memoir to which the Société des Sciences de Bruxelles awarded the Prix Seutin for 1890, deserves mention. The author discusses the subject of surgical intervention in lesions of the brain in its historical, clinical, and experimental aspects. Reference may be made to the following papers of interest: Manley,¹³⁹_{Sept.} on the “Operative

Treatment of Intra-cranial Lesions"; Agnew,¹¹²_{Oct.} on the "Present Status in Brain Surgery," based on the practice of Philadelphia surgeons; Bremer,⁸²_{Oct. 17} an "Outline of Cerebral Surgery"; Rieffel,¹⁰⁰_{Mar. 7} "La Topographie Cranio-encéphalique et les Nouvelles Opérations en Chirurgie Cranio-cérébrale."

There is an interesting communication made by J. Ashhurst,⁹_{June 20} to the Philadelphia Academy of Surgery, in regard to a number of operations performed by him upon some of the larger nerves. We note a review,⁷³_{Feb. 7} of a work by Poirier,²⁰⁶⁷ entitled "Topographie Cranio-encéphalique," which would seem likely to be a valuable aid to those who are employed in operations on the brain. Another book on the same subject, entitled "La Topographie Cranio-cérébrale; Applications Chirurgicales," by Le Fort,²⁰⁶⁸ is also reviewed,³³⁶_{Oct. 10} as well as one by Tellier,²⁰⁶⁹—"Des Suites Éloignées des Traumatismes du Crâne et de leur Traitement par la Trépanation."

Starr,¹_{June 20} discusses the cerebral atrophies of childhood, with special reference to their surgical treatment. He regards this as indicated only where epilepsy ensues, and then only as a palliative and not as a curative measure, since the attacks are due to organic changes; but their frequency can be much diminished. He discourages the re-implantation of the bone-discs in such cases, as the mobility of the connective-tissue covering modifies the tension exerted upon the brain-substance. Another notable article is one by Bullard and Bradford,⁹⁹_{Apr. 20} in which, in connection with a case treated by them, they present a very valuable *résumé* of the surgery of the cerebellum. We may mention a notice,¹⁷_{June 9} of a brochure by Montaz²⁰⁷⁰ on the frontal sinuses, and their treatment by trephining, and, perhaps, by draining into the nasal fossæ. This may be called for in cases of wounds with splinters or foreign bodies, tumors, parasites, or suppurative inflammation. Such instances are certainly rare, and it scarcely seems as if the subject demanded special discussion.

TUMORS AND CYSTS OF THE BRAIN.

With regard to the etiology of choked disc in cases of brain-tumor, Hoesslin,⁸⁴_{Dec. 9, '90} rejects the view of von Graefe that mere pressure upon the cavernous sinus can produce it, on account of the free anastomosis existing between the ophthalmic and the facial veins; but when the veins of the frontal region become congested

by pressure upon the sinuses which should carry away their contained blood, the channels are not free enough to relieve the intra-orbital veins, and the discs become choked. When the anastomosis of the frontal vein with the facial veins is free, the blood passes off in this way. A very extraordinary case is reported by Terrier, ¹⁰_{Aug. 4}, in which a large part of the frontal bone, with the subjacent dura and a portion of the falx cerebri, three inches in length, had to be removed; the longitudinal sinus was, of course, divided also, and a ligature was applied to each of the cut ends. The patient was a woman aged 52, with a syphilitic history; but the operation was undertaken on account of an epithelioma, originating, probably, in the dura. Healing took place promptly. A somewhat similar case, except that the tumor was external to the dura and that that membrane was not opened, is recorded by Broome. ⁸²_{Oct. 10}. The patient is said to have suffered severely from cerebral symptoms. In the case of a boy aged 16, the subject of epileptiform convulsions affecting the left arm, Péan ¹⁵_{Aug.} trephined over the upper part of the right parietal convolution, and excised an angioma of the meningeal vessels. The boy is said to have made a good recovery.

A case of meningeal angioma, in a boy aged 15, is reported by Péan. ¹⁶⁴_{Jan. 28}. The boy had epileptic seizures, affecting the left arm, with spasmodic contractions of the pharynx, and violent pain in the head at the upper anterior angle of the right parietal bone. As these symptoms pointed to a tumor pressing on the motor centres, trephining was performed, and a mass of varicose veins in the meninges, communicating with the longitudinal sinus, was discovered and removed. No blood was lost; the tributary vessels being compressed, at first temporarily, and then permanently. Péan dwells upon the danger of such tumors unless surgically dealt with, and points out the value—as distinguishing them from solid tumors of the same region—of the influence of flexion of the head forward, as well as of compression of the corresponding internal jugular vein. Mayo ¹⁰⁵_{Feb. 15} records a case, diagnosed as one of aneurismal varix in the cavernous sinus, relieved by ligation of the common carotid artery. The patient, a man aged 56, had been thrown from a wagon, his head striking a post; he bled from the ears and nose, and for three weeks was unconscious. Intense headache and giddiness, with marked strabismus, ensued; all the veins about the

right eye were distended and pulsating, and a bruit was perceptible ; hearing was almost destroyed. The artery was tied with catgut, on the absorption of which there was a slight return of the symptoms, but not enough to prevent the patient from going to his work as a farm-hand.

Puzey,⁶ reports a case in which a man aged 37 had an arterio-venous aneurism within the cranium, probably in the cavernous sinus, from a blow on the head sustained fourteen months previously. The usual symptoms were well marked, but subsided materially by rest, low diet, with only a pint ($\frac{1}{2}$ litre) of liquid per day, full doses of potassium iodide, and digital pressure on the carotid. It was proposed to tie this vessel, but the man refused, and went home, to return, after nine months, in a much worse state; the left eye was forced forward by a swelling as large as a tangerine orange, the cornea hazy, the lids red and œdematous ; large vessels, apparently veins, were easily felt pulsating in the orbit, and a loud bruit was perceptible. Sleep was prevented by the noise continually heard by the patient himself. On ligation of the left common carotid artery, the symptoms were relieved and an almost uninterrupted recovery took place; the cornea had, however, given way, and the iris was adherent; but the loss of vision which ensued was ascribed to atrophy of the optic nerve, from long-continued stretching.

Jeannel,³ reports the case of a baker, aged 32, who had an attack of apoplexy, which left some paresis of the right upper limb. A second attack, two months later, was followed by spasmodic movements of that part, with occasional general convulsions. There was marked aphasia. There was an obscure history of a wound, and a small scar in the left temporal region. Trephining was performed over the Rolandic line, and beneath the dura there was found a soft, violaceous mass, which was curetted out, leaving a cavity about the size of an almond ; two punctures were made in the brain, without result. The wound healed well, but temporary paralysis of the right arm ensued; and, although speech was restored, it was slow and stammering. The arm became contracted, and epileptiform crises continued to recur about once in two weeks.

A case of cerebral tumor, successfully operated on by Postempski, is reported by Minossi.² The patient, a woman

aged 58, had suffered for about ten years from pain in the right arm, and recently had had attacks of clonic convulsions, not only in that limb, but in the eyelids and in all the muscles supplied by the right facial nerve. There was also aphasia, with transient verbal amnesia, and, later, paresis of the right facial and hypoglossal nerves. Trephining was performed, and a subcortical tumor (probably a glioma), the size of a large chestnut, was removed from the middle of the left ascending parietal convolution. Right hemiplegia immediately followed, from plugging of the wound, and next day the urine contained some sugar and traces of albumen. Healing took place well, and all the symptoms ceased. Some inability to extend the fingers of the right hand, and some trophic changes in the skin of that part, were the only traces left of the disorder. A case in which a cystic glioma was successfully removed from the brain of a boy 10½ years old is reported by Reynier.⁵¹_{Sept.} The child began at 3 years of age to have cerebral disturbance, and at 7 attacks of *grand mal* appeared, which resisted treatment. An operation was performed, and the tumor found imbedded in the cortex, on the anterior border of the ascending frontal convolution, between the second and third frontal. A portion of the sac being left, the cyst re-formed, and, at a second operation, the whole of it was curetted out. Only a slight and temporary return of the seizures was noted.

A very full report is given by Anderson and Buchanan,²_{Nov. 14} of a case of cerebral tumor successfully removed. The subject was a boy aged 17 years, who, at the age of 12½ years, had an epileptic attack, beginning in the left forearm; after this, for three years, he had occasional slight pain, numbness and weakness of the left hand; then another fit, preceded by oscillatory movements of the head, occurred, and was quickly followed by others. Under treatment these subsided, but returned soon after he left the hospital, and became very frequent and severe. Weakness and coldness of the left arm and hand, with a less degree in the lower extremity, and some facial paralysis; optic neuritis, most marked in the right eye; phosphatic urine, and pain and tenderness behind and above the right ear, were the chief symptoms presented. Hence, it was judged that the lesion was cortical; that it was a tumor; and that it was situated about the junction of the middle with the lower third of the right ascending parietal convolution. An operation

was performed by Buchanan at a point indicated by Ferrier's plan, a large trephine being applied behind the lower part of the Rolandic fissure; the dura seeming normal, another button of bone was removed, about two inches higher up, and the intervening bridge separated with Hey's saw and raised. All the pieces of bone were placed in warm carbolic solution. The dura was now clipped away so as to expose the cerebral surface; a slight bulging was noticed at about the centre of the first trephine-hole, and as this was touched with a director it burst, giving exit to a dark-red or brownish body, the size of a plum, which was readily removed. The cavity closed at once. The dura was stitched up and the removed bone was replaced, the large piece having been cut into four or five portions; a drainage-tube was inserted, and the wound closed. Recovery was rapid and complete, only a few occasional nervous symptoms and three slight epileptiform seizures occurring. Some spastic contraction of the left arm after exercise was noted, but at the time of the report was daily lessening. The tumor was examined, and found to be a spindle-celled sarcoma, of the plexiform variety.

Carson⁶⁶³ reports the case of a man aged 30, who, after an attack of typhoid fever, had paresis of the right arm, and, later, spasms beginning in the fingers. The diagnosis was made of a tumor, involving the hand-centre, or extending across the Rolandic fissure about at its middle. Two trephine-holes were made and the intervening bone chiseled away; the dura did not pulsate; the tumor, weighing 3 ounces (93 grammes), was removed. Excessive hæmorrhage from enlarged arteries followed. The patient died, fifteen days afterward, from an injection of ammonia given by an assistant. The nature of the tumor is not stated.

A case of very extensive cystic degeneration of the left hemisphere of the brain is reported by Hammond.⁹ The patient was a girl 19 years old, and the disease would seem to have begun in the fifth week of her life. She was feeble-minded and excitable, with left-sided hemiplegia and frequent epileptic seizures. Trephining was performed, but without effect, the patient dying in coma on the sixth day. Another case is reported by the same surgeon in a man 38 years of age, who had had, twenty years before, a fracture of the right parietal bone, with loss of fragments and resulting depression of the scalp. Upon operation, a cyst was

opened, from which so large an amount of fluid was evacuated that it seemed that it must have communicated with the lateral ventricle. The man died of exhaustion on the fiftieth day.

In a case reported by Doyen, ³_{Apr. 1} a boy aged 16 had presented since his seventh year feebleness of intellect, epileptiform crises, and left hemiplegia; the vision of the right eye was lost. A diffused expansion was manifest in the squamous portion of the right temporal bone; trephining was performed and an albuminous cyst emptied and drained, with the result that, in two months, the boy was well. A case of Jacksonian epilepsy, due to a cystic tumor, which was removed in two operations, with relief, is recorded by Reynier. ³_{Apr. 1} The patient was a girl aged 10, who had a cicatrix in the left parietal region; the attacks began in the face. At the first operation the cyst was seen, but, as it extended beyond the trephine-hole, a portion of its wall only was excised. A second operation was performed, the opening enlarged, and the cyst curetted out. It was found to be a glioma, with a central cavity. Healing took place well, and the child had no crises, except two in the first week.

Söderbaum ⁶⁸_{Aug.} relates the case of a girl aged 11, who, after a slight headache, had paralysis of the left upper extremity, extending, a week later, to the side of the face and the lower limb. About seven weeks afterward convulsions occurred, and the spastic paralysis of the lower limb increased; the right motor zones were painful on percussion. A portion of bone was removed with the chisel,—at “the upper portion of an oval incision running upward from the fissure of Rolando”; the pia was found somewhat thickened; a tenotome was several times thrust into the brain to a depth of three centimetres, but only gave exit to some slightly bloody serum. The symptoms all subsided. The author suggests the probability that a small cerebral cyst was evacuated and subsequently collapsed. A further report is given ⁸⁶⁶_{Sept.} of a case detailed last year by Oppenheim and Koehler (see ANNUAL for 1891, p. A-5). A gliomatous cyst was removed April 18th; at the end of June she had slight spasm of the left side of the face and tongue; she had a normal accouchement July 21st; six weeks later she had a typical attack of cortical epilepsy, and after this she had frequent headache and vertigo, with heaviness of the left arm and a tendency to fall toward the left side. A third convulsion occurred

late in October, and six weeks afterward she died, having become completely hemiplegic. An autopsy showed a glioma with several cysts, as large as an apple, and destroying the lower halves of both central convolutions on the right side; it was surrounded by an area of encephalitis.

In a case reported by Bremer⁸²_{Apr. 4}, a number of echinococcus cysts were removed from the brain of a girl about 12 years old. She had suffered for some weeks from intense headache, until a soft, swollen spot appeared on the right side of the head, about two and a half inches above and a little in front of the ear; there was paresis of the left side of the face, left arm, and left leg. In the operation (it is stated) the lateral ventricle was opened. The case was too recent for the result to be known.

HYDROCEPHALUS.

Historically, it may be of interest to note that the modern operation of trephining and tapping the ventricles of the brain dates back, as a proposition, to 1881, and is to be credited to Wernicke. It was again suggested in 1886 by Zenner, and in 1888 by Keen. It has been four times performed: in 1887, by von Bergmann; in 1888, by Ayers and Hersman; in 1889, by Keen; and in the same year (successfully), by Robson. These facts are developed in a correspondence as to the matter of priority.²_{Feb. 28; Mar. 7, 14} Some previous instances—one by Bedor, as early as 1827—were simply punctures through the anterior fontanelle or coronal suture and the corpus callosum for the relief of hydrocephalus; the degree and permanency of the success attained is a matter of doubt.

Repeated tapping of the ventricles is reported by Spencer Smyth²_{Mar. 20} to have been resorted to by him, "many years since," in a case of hydrocephalus in a child 6 months old, who had sustained a fracture of the skull by a fall from the nurse's arms. The operation was done six times; the child finally died of exhaustion. Tordoff²_{Apr. 18} states that in 1876 he removed, with the aspirator, 10 ounces of fluid from the head of a child 2 years old, with satisfactory result, the fontanelles closing and the child becoming able to walk. In the case of a boy aged 7,—blind, paralyzed, with agonizing pain in the head, and occasional epileptic seizures,—Lowson²_{Mar. 21} drilled the skull a little to one side of the sagittal suture, and passed a cannula into the ventricle, attaching a tube so

as to maintain drainage. Rapid improvement ensued, but on the seventh day the boy pulled the tube off and the cannula slipped into the ventricle; death occurred in coma the next day. Lowson suggests that the easiest way of relieving the excess of cerebrospinal fluid would be to tap at the very lowest point of the canal in the spine. A much more favorable result is reported by Illingworth.²_{Apr. 4} The patient was a boy aged 3 years, who had been hydrocephalic from the age of 9 months; his intellect was unaffected, but he suffered from sleeplessness and pain. During anæsthesia a trocar was thrust through "the anterior and outer corner" of the anterior fontanelle, downward and inward; on reaching the ventricle, a jet of clear, serous fluid spouted out. Drainage was made by means of a collared cannula, which, however, was pushed out in about a week's time by the healing process. Recovery took place without a bad symptom.

Karnitzky²_{Oct. 31} has reported 5 cases of hydrocephalus treated by puncture, in 1 only with success. A very favorable result attended like treatment in a case reported by Unverricht,²¹_{Oct. 5} and it is to be inferred that, in 3 other instances mentioned but not detailed, this surgeon was also fortunate, since he says that his observations encourage him to further trials of the method. Vinke⁸²_{Feb. 20} reports the case of a colored child, now 6 years old, operated on successfully by him for hydrocephalus in infancy. Convulsions and other pressure symptoms had been present; aspiration was repeatedly done, with only temporary benefit, and an incision was made through the fontanelle, with the result stated. A case is reported by Broca,³_{Feb. 25} in which a boy aged 4 years had had for three months a contracture of the left upper extremity following upon convulsions; he was hydrocephalic and mentally defective, but the fontanelles were closed; trephining was done three centimetres above and behind the right auditory meatus, and the ventricle was drained, with relief of the contracture.

Broca³_{Apr. 1} mentions having opened and drained the left lateral ventricle in the manner advised by Keen; he trephined three centimetres above and behind the auditory meatus, and passed in a trocar just above that orifice. The indications were derived from the history of the child, the form of the head, and the fact that there was contraction of the right upper limb.

From researches made by him on the cranio-cerebral topog-

raphy of children under 3 years of age, Moussous¹⁸⁸_{July 22} states that the point at which it is best to trephine for the purpose of reaching the lateral ventricles is *two and a half* centimetres above and three centimetres behind the external auditory meatus; not, as given by authors, *three* centimetres above and three centimetres behind. Trephining in the right parietal region, in a case of acute hydrocephalus in a child 5 years old, is reported by Macdonald⁵⁵⁷_{Apr.} to have failed to give relief, death ensuing in twelve hours. At the autopsy, a large quantity of fluid was found surrounding the cerebellum and the base of the brain generally, and it seemed as if an operation at the base would have been more effectual, as giving exit to this. It is proposed by Quincke⁵⁷_{May 2} to substitute paracentesis of the spinal canal for trephining of the skull in cases of hydrocephalus. He has carried out the idea in 3 instances, introducing the needle of a Pravaz syringe between the third and fourth lumbar vertebræ; in all, the pressure symptoms were relieved as the fluid escaped, and in 1, a child of 2 years, with acute hydrocephalus, the benefit seemed to be permanent. This procedure has been adopted by Wynter,⁶_{May 2} but not with success in saving life. It has been proposed also by Lowson.²_{Mar. 21}

ENCEPHALOCLE.

A case of encephalocle, in a child 15 days old, is reported by Picqué¹¹²_{Nov.} as having been successfully operated upon. The tumor is said to have been as large as the head of a fœtus at term, partly fluctuating and partly solid; it was punctured with a bistoury, and then excised; healing ensued. But it should be noted that the semi-comatose condition in which the child had been since its birth "seemed to have diminished," so that a brilliant success can hardly be claimed. Apropos of a case reported by Picqué to the Société de Chirurgie, Berger³_{Apr. 15} remarks that hydrencephalocles are more complex, and present more variety in their pathogeny and conditions than is generally stated. In Picqué's patient there was a fluctuating mass projecting from the occipital lobe; it was opened, and found to consist of the dura, lined with cerebral substance, and containing liquid; a like mass sprang from the cerebellum. Both were tied and clipped off. The healing was without incident, but the child remained in the semi-comatose state in which it had been before the operation, and was,

unfortunately, lost sight of; so that the ultimate result was not known. As the liquid was not cerebro-spinal nor intra-ventricular, Berger regards these tumors as cystic. He had seen others, which seemed to be veritable tumors, derived from the primitive cerebral vesicle, and preventing the closure of the cranial bones; and refers to the view of Spring, that hydrencephalocoele may be due to encysted dropsy of a cornu of the ventricle wearing away the cranial wall in forcing its way outward. Such was certainly not the *rationale* of the case reported by Picqué. It may be noted that Berger states that he had operated, thirteen months previously, on a little girl, removing an encephalocoele as large as an orange with perfect success.

According to Broca,²_{Sup., June 20} the treatment of encephalocoele by pressure, puncture, or injection of iodine is to be condemned; excision is the proper course; two small skin-flaps should be made, and the tumor surrounded at its base by a ligature placed as deeply as possible. Usually, the outgrowth is not composed of cerebral substance, but is a true neoplasm; in König's case, it was a telangiectatic glioma. Broca refers to Picqué's case, above mentioned, and thinks the course pursued was a proper one; he seems to have thought the improvement greater than would appear from the statement we have quoted. Facts are as yet wanting to enable us to judge of the amount of advantage to be gained in the way of mental development in such cases.

INTRA-CRANIAL HÆMORRHAGE.

A case of extra-dural hæmorrhage from a blow on the head, producing very grave symptoms, and relieved by trephining, is reported by Ghent.⁴⁰_{Aug.} A case of subdural hæmorrhage, diagnosed and relieved by trephining, is reported by Carson.⁶⁶³_{Aug.} The patient was a man 20 years old, who fell about ten feet, striking his head; for several days he had no special symptoms, but then motor aphasia and deviation of the tongue appeared; next day there was partial paralysis of the right arm and impaired sensation; and, on the following day, he could not walk. A trephine was applied, one and one-fourth inches behind the external angular process and one and one-fourth inches above the line from the process to the external occipital protuberance; the dura did not pulsate, and was opened, when a clot and a quantity of liquid

blood were removed. The dura was left open, and a horse-hair drain kept in for forty-eight hours. A good recovery ensued.

A case of non-traumatic meningeal hæmorrhage, in which trephining was successfully performed, is recorded by Michaux.³_{Apr.1} The patient was a man, an absinthe-drinker, attacked with apoplexy, left facial hemiplegia, and paralysis of the right upper limb. During the next few days the paralysis extended to the right lower extremity; epileptiform convulsions ensued,—at first limited to the affected parts, but later becoming general and continuous. A large trephine was applied three times over the left Rolandic fissure, making an opening six centimetres in length; the dura was incised, and a quantity of large, dark clots evacuated. Recovery was rapid, and at the end of five months there remained only some awkwardness of speech, with slight weakness in the right arm. Michaux regarded the hæmorrhage, in this instance, as due to alcoholism or to uræmia, and urges the more frequent employment of the trephine in similar cases. Duret,³_{Apr.1} calls attention to the importance of traumatic aphasia as an indication for trephining. He gives an instance, in a man who was thrown from a wagon to the ground; he walked home and continued his work as a butcher, but had pain in the left parieto-occipital region; by the fifteenth day this became very intense, and he lost the power of speech, with slight paresis on the left side. An effusion of blood, pressing upon Broca's convolution, was suspected, and, on trephining, this diagnosis was verified, a large amount of clot being scooped out from beneath the dura. From the fourth day he began to say "yes" and "no," and by the twelfth he was able to go out and return to work. Unfortunately, on the twenty-third day he drank hard, and was attacked with intense cerebral congestion and general convulsions, which proved fatal.

Manley¹³⁹_{Sept.} condemns the practice of trephining in cases of intra-cranial hæmorrhage as vicious, illogical, and dangerous. He thinks that the use of anæsthetics adds greatly to the risks of operations on the head by inducing engorgement of the cerebral vessels.

Guldenarm and Winkler²_{Aug.22} report the case of a recruit, aged 26, who was kicked on the head by a horse. He had acute right-sided headache and dizziness, and a large bruise appeared over

the upper part of the right parietal bone. Next day there was excessive tremor of the hands, and he went into hospital; headache persisted, and his gait and vision were impaired. Later, his hearing became defective on the left side, and his memory was imperfect. Slight left facial paresis, inability to lift the left arm, and total paralysis of the left leg ensued. Trephining was done at a point of tenderness corresponding to the bruise; the dura bled very freely; it was opened, and a blood-cyst, the size of a hazel-nut, was found beneath it. The dura was adherent to the œdematous arachnoid, and there were numerous Pacchionian granulations about the adhesion. The blood-clot was removed. A very rapid recovery followed, the paresis of the left arm and leg improving the same day, and all the symptoms having disappeared in three weeks.

CEREBRAL ABSCESS.

A case of cerebral abscess, placed on record by Moreno,⁴⁵⁹ is worthy of special note. The patient was a woman aged 31, of neurotic history; married twelve years; she had borne two children, and had had nine abortions or premature births. She had for many years had attacks of furunculosis every summer. One day she had spasms in the right arm, followed in three days by paralysis of the right arm and leg. Next day she had headache, restlessness, loquacity, photophobia, and abnormal acuteness of hearing; her face and tongue were drawn toward the right. Six days later these symptoms had subsided, but she still had supra-orbital neuralgia. Ten days afterward these phenomena re-appeared, with fever, the temperature on the sixth day rising at evening to 40.5° C. (104.9° F.). On shaving the scalp, it was found to present an œdematous area. Slight improvement occurred for four days, and then the headache again became severe. Abscess of the middle portion of the motor area being suspected, she was trephined; the meninges were found very vascular, but the cerebrum pale and non-pulsating; a bistoury was thrust in, and an abscess opened and drained. She reacted well, but the paralysis persisted. Three weeks later she had several severe chills, and all the symptoms recurred; her temperature was 40° C. (104° F.). Menstruation came on next day. Her condition remained about the same for six days, but she then began to fail rapidly. An abscess was detected in the flap, and was curetted and dressed. She now be-

came delirious, with diarrhoea and a morning temperature of 40° C. (104° F.); evening, 41.5° C. (106.7° F.). Coma ensued, and the temperature ran up to 41.8° C. (107.2° F.), after which it fell rapidly, and death took place. The whole duration of the illness was sixty-three days. An autopsy showed the dura thickened, very vascular, and everywhere adherent to the brain; there was phlebitis of the longitudinal sinus in its whole length; near the cicatrix of the first operation another abscess was opened, which had destroyed the whole of the right hemisphere of the brain except the occipital lobe. The ventricles were all filled with pus.

A case of cerebral abscess, localized by focal symptoms and successfully treated by trephining, is reported by Nason.³² The patient was a boy aged 18, who fell on the back of his head on the pavement; he had headaches, and on the fifteenth day a severe chill. When seen, eleven days later, he was very ill, with a temperature of 103.4° F. (39.7° C.); four days after that the left side of the face and the left arm became paralyzed and insensitive; the temperature then fell to 99.4° F. (37.4° C.), but next day he had a rigor, and a convulsive seizure beginning in the left side of the face. Trephining was performed over the lowest third of the fissure of Rolando, and an abscess opened beneath the cortex of the lower end of the ascending frontal convolution. Recovery was rapid, power returning to the muscles of the upper extremity from above downward. It may be noted that, on the twelfth day, the urine was found charged with blood and micrococci,—a condition which gradually passed off. Another case, in a boy aged 15, is recorded by Dodge.¹⁰¹ The boy was in a state of coma, his pulse 60, his temperature 102° F. (38.9° C.), his pupils dilated. Trephining was performed through necrosed bone, a small amount of pus escaping. Puncture of the brain in various directions detected no pus in its substance. Complete recovery ensued.

A case of intra-cranial abscess, following upon suppuration of the middle ear, and successfully operated upon, is reported by Stimson.¹ The patient was a man aged 39; the illness began with a severe cold; when seen, he had a temperature of 102° F. (38.9° C.), and was semi-comatose; he remained so for six days, his urine and fæces being passed involuntarily. On opening into the posterior part of the squamous portion of the temporal bone,

an incision into the dura gave exit to about 3 ounces (90 grammes) of thin pus; no bare bone could be felt. He gradually recovered, irrigation of the cavity being occasionally necessary. His mental condition during this period was curious: his memory was gone, and he miscalled objects; he could not read, and found difficulty in doing so even after all his other symptoms had disappeared, except some feebleness and uncertainty in walking. It may be noted that, in this case, the chisel was employed instead of the trephine in perforating the skull. Another case, in a girl aged 17, is reported by Mayo.¹⁰⁵ Feb. 18 This patient had pain, relieved by a discharge of pus from the left ear; the discharge having ceased, there was headache for two weeks, then pain in the ear again and three epileptiform spasms, when the discharge recurred; there was now intense pain, loss of memory, photophobia, and cold sweats. The mastoid process was now gouged and curetted, as was a small sinus leading upward; about a drachm of pus came away. Relief was given for about three months, when the symptoms returned, with loss of power in the right arm, and, to a less degree, in the right leg; optic discs congested and swollen; tongue drawn to the right. The skull was opened with the chisel and rongeur forceps, one and a half inches above and behind the left meatus externus. Incision of the dura and cortex gave vent to 10 drachms (18 grammes) of inodorous pus, and a good deal of discharge ensued for many days. All the symptoms were relieved, and the patient recovered full health.

Two cases of intra-cranial abscess are reported by Pritchard.¹³⁶ Aug. 18 In one,—that of a young man of 23, under the care of Rose,—there had been otorrhœa of the left ear from infancy. Upon the sudden onset of left facial convulsions, with somnolence, trephining was performed close to the meatus, and the surface of the dura found bathed in fetid pus. Healing was rapid and the symptoms disappeared; several times during convalescence there was transient aphonia. A year of treatment was needed to set aside the affection of the ear. The other case, under the care of Cheyne, was that of a man, aged 26, affected with otorrhœa of the left ear for seven or eight years. In September, 1889, he had a sudden attack of pain over the left side of the head; next day he had two chills, and then vomiting. On admission to hospital, he complained of severe cephalalgia, located in one spot in the left temporal fossa;

there was giddiness, and fetid pus flowed freely from the ear. Three days later fever, with vomiting and delirium, came on, and then jerks of the left facial muscles. A trephine was applied one and one-fourth centimetres above and behind the meatus, and a puncture of the brain gave exit to $\frac{1}{2}$ fluidounce (15 grammes) of fetid pus. Improvement ensued, but was only transient, the chills and delirium recurring. Fresh punctures of the brain detected no pus; the mastoid process was trephined and found sound. Transient paralysis of the right arm and leg and optic neuritis were noted. A day or two later, a fresh flow of pus occurred, and from that time convalescence began, with only slight and transient verbal deafness.

A case of cerebral abscess, in a boy aged 12, is reported by S. Paget.²_{Nov. 10} There had been left-sided otorrhœa, with intense headache, giddiness, and strangeness of manner; there were several points of exquisite tenderness in the left temporal, motor, and occipital regions. Suddenly there came on vomiting, right facial paralysis, weakness of right arm, partial aphasia, and left optic neuritis. Trephining was done over the left Rolandic fissure, and 1 ounce (30 grammes) of pus escaped; the abscess refilled, and another trephining lower down was done; two days later an offensive blood-clot came away. A small hernia cerebro appeared at the upper part of the wound, but was cured by elastic pressure. The wounds healed soundly and the boy recovered, but with some right-sided facial paralysis. In connection with this case, Dunn reported a similar one, in which a fatal result ensued; an autopsy showed extensive suppurative meningitis, caused by a cerebral abscess, which had opened onto the surface of the brain.

In a case reported by Gluck,¹⁵⁸_{B. 13, H. 4, 5, 6} a boy aged 6, who had for three years had otorrhœa on the left side, was attacked with violent pains in the left frontal and temporo-parietal region, and with fever; temperature, 102.2° F. (39° C.). The parts supplied by the left facial nerve were affected at intervals with lightning-like twitchings, which could be excited by tapping. The mastoid process was chiseled away; no focus of suppuration was found. Next day the pains were more severe; the evening temperature was 105.4° F. (40.8° C.); the twitchings became less frequent, but the neck stiffened. Further chiseling of the mastoid to the dura disclosed no pus. Hyperæsthesia of the skin and opisthotonos came

on, and the child died on the fifth day. An autopsy showed, in the left temporal lobe of the brain, an abscess the size of a hen's egg, communicating with the left lateral ventricle; there was purulent arachnitis of the base of the brain; the roof of the tympanum was carious, the dura was destroyed at that point, and there was pus between it and the bone.

Two cases of cerebral abscess are recorded by Grubert.²_{Mar. 14} In one, a man aged 22 had extensive inflammatory destruction of the left middle ear, followed by profuse and repeated bleeding, to arrest which ligation of the common carotid was performed,—first on the same side, and fifteen days later on the other; trephining and exploration for abscess were also done, but no pus was detected. The patient dying comatose sixteen days later, an autopsy disclosed a small collection of thick, greenish pus in the white substance of the left cerebellum, close to the petrous portion of the temporal bone. In the other case, a man aged 26 sustained a compound fracture of the skull, which was followed by no head symptoms until the fifth day, when suppuration took place over the whole surface of the brain, causing death five days later.

A very interesting instance of recovery from cerebral abscess is recorded by Ledderhose.⁶⁹_{Aug. 6} The patient, a boy 7 years old, was struck, on April 20, 1888, in the left temporal region, apparently with a sharp piece of iron. On the second day the wound, which was clearly a penetrating one, was sutured, but erysipelas ensued and the stitches tore out; free suppuration took place. On the seventh day there was a brief clonic convulsion in the tongue and left side of the face; another recurred on the next day, and none after that for two years. During this time there was anorexia, and about every fourth week pains in the belly, headache, and vomiting. The wound healed in about six months, but soon broke out again and suppurated freely, but at length closed, leaving a very sensitive scar. Previous to this healing the boy had two severe night-attacks of giddiness and anxiety. Late in April, 1890, after a week of general discomfort, with vomiting and giddiness, another convulsive attack occurred; there was twitching of the tongue and left side of the face. After several such seizures, there were some in which the whole face was involved; after this only the right side of the face was affected. In the middle of May the child was seen by Ledderhose, who suspected reflex irritation and excised

the scar. The wound healed at once, but after two weeks burst open again, with a small suppurating swelling at its lower part. The convulsive attacks, set aside for six weeks after the operation, then recurred with greater frequency and violence. It was suspected that a splinter of bone, or some foreign body, was present. On July 24th an operation was performed, the bone being chiseled away and a cicatrix involving the dura and brain-substance extirpated; a director passed in, entered an abscess, which was evacuated; the finger could be put into the cavity up to the second joint, and touched the falx cerebri. Small portions and one large mass of necrotic tissue came away, and in four weeks healing was complete. The child had no more symptoms, except a slight temporary paresis of the right upper lip and a brief twitching of the right corner of the mouth on the day of the operation. The comments given on this case are very interesting, but do not admit of an abstract. A case of extensive cerebral abscess, due to an old otitis media, in which trephining and evacuation of the pus were performed, but too late to save the patient's life, is recorded by Dandois.⁵²
Sept.

TREPHINING FOR EPILEPSY.

In a discussion on the medical aspect of trephining in epilepsy, Gray¹_{Dec. 18, '70} suggested that it was well to ask,—What is epilepsy? It is still a question whether it is a disease or merely a symptom; and, if either, what is its cause and nature? The removal of every source of irritation may not effect its cessation. We have not histories or data of definite value, because the cases are not kept under observation long enough, or with a precise object. Our knowledge of the focal centres is as yet imperfect; in fact, the whole matter is still *sub judice*, and demands further investigation. No doubt there are many who will be surprised at such frank statements; but their truth will be acknowledged by any one who is thoroughly familiar with the literature of the subject, or who has had practical experiences in these cases. In a paper read before the New York Academy of Medicine, Sachs¹_{Oct. 22} discussed the surgical treatment of epilepsy, urging that this affection is not a disease but a symptom. In the present state of our knowledge we cannot always point out the lesion which causes true epilepsy, but this may be done by further-improved methods. The author thinks that in a given case of traumatic or organic lesion an opera-

tion should be done as early as possible, in the hope of preventing secondary sclerosis; if no operation is done an epileptic seizure is a warning that secondary sclerosis has occurred, and then we should operate in order to set aside further trouble. Excision of the affected area is the only rational procedure, and may be wholly successful if the irritation has not spread to other centres. Even if a complete cure is not effected, the frequency of the attacks may be diminished, to the great comfort of the patient.

With regard to the operative treatment of Jacksonian epilepsy, Terrier,³_{June 10} thinks there is yet some uncertainty as to the class of cases demanding it, as to the way in which it proves of benefit, and even as to the extent of the interference needed. He quotes a case of Verchère's, in which the disease was the result of a trifling trauma dating back ten years. An exploratory operation, merely exposing the surface of the brain for a space six centimetres square, greatly relieved the symptoms, but was followed by some degree of paresis of the previously affected limbs. Apropos of this report, Lucas-Championnière,³_{June 17} remarks that it is an error to suppose that in Jacksonian epilepsy operation is always indicated, or that it always affords a clear guide to the point to be attacked; and in support of this statement he cites 4 instances in his own practice. He agrees with Horsley, that trephining is a grave procedure when there are extensive lesions, and that it is best to open the cranium freely, rather than to uncover a spot determined in advance, in the hope of coming upon a strictly localized lesion. The removal of compression almost invariably is of benefit, especially when there is a lesion of limited extent, or accompanied by paralytic symptoms. As to the re-implantation of the removed bone, this surgeon regards it with disfavor, deeming it better to leave a yielding wall. Both Terrier and Lucas-Championnière were inclined to deprecate the removal of the motor centres,—the former because the resulting cicatrix might, in its turn, become a source of epileptiform crises, and the latter for two reasons: (1) because the true seat of irritation may be elsewhere, and (2) on account of the risk of inducing paralysis which may be permanent. This danger is insisted upon, also, in an article on the "Surgical Treatment of Cortical Epilepsies," by Wagner.⁵⁷_{June 14}

In an essay on the supposed curative effects of operations *per se*, White⁹⁶_{Aug} cites a number of instances in which epilepsy and other

morbid nervous phenomena have been set aside, either temporarily or permanently, by surgical procedures, although no lesions were found. Among the operations for epilepsy were trephining, ligation of carotids, castration, tracheotomy, excision of cervical sympathetic ganglia, incision of scalp, etc. Some cases are also cited in which the symptoms of epilepsy subsided or disappeared, apparently as the result of severe accidental injury,—a fall, a burn, or an amputation of a limb. An interesting case, in which a groove, about three and one-fourth inches long, at the right side of the skull, remained as the effect of the pressure of obstetric forceps, is recorded by Lane.⁹⁶_{Nov.} Epilepsy developed itself at the age of 14 years, and two years later the depressed portion of bone, thin and vascular, was removed with a gouge and forceps. After the operation the fits became comparatively slight and infrequent. Manley,¹⁹_{July 11} reports another instance in which the application of obstetric forceps caused a permanent depression of the parietal bone, the substance of which became eburnated. Epilepsy developed itself, and, at the age of 22, the patient was trephined, with apparent success. A case of traumatic epilepsy, in a child, relieved by trephining and chiseling away a depressed portion of bone in the right temporo-parietal region, is recorded by Pedrazzi.⁹⁶_{Nov.} The removed bone was found covered with osteophytes on its inner surface. Another case, in a young man, is reported by Maglioni.⁹⁶_{Nov.} No lesion was found, but the epileptic seizures ceased.

A case is reported by Ricketts,⁵³_{Jan. 24} in which a blow on the left parietal region was followed in sixteen hours by an epileptic seizure, and from that time, for three years, the attacks were almost incessant. Trephining was now resorted to, and an oval-shaped opening, about two and one-half inches long, was made in the cranium at the seat of injury; the dura was not divided. After this, the convulsions were less frequent and less violent, and unattended with loss of consciousness. The patient was 30 years old at the time of the operation. The early onset of the symptoms in this case must be regarded as very remarkable. Garibaldi,²_{Sept., Oct. 17} records the case of a man aged 23, who, ten years before, had had a fall, causing a compound comminuted fracture in the right fronto-parietal region, and followed by epileptic attacks, of which the left leg was the starting-point; there was a scar of the scalp, and irregular prominences and depressions of the bone beneath. Tre-

phining was performed, the whole of the damaged bone being removed; a swelling, a little larger than a hazel-nut, at the anterior part of the wound, was opened, and some serous fluid evacuated. Healing took place well, but there was only a slight improvement as to the seizures. A case is reported by Barrow²²_{Oct. 7} in which a woman aged 29, injured in childhood over the right eyebrow, had for seventeen years suffered from epileptic seizures, with impairment of intellect and memory. Trephining was performed at the seat of the old hurt; the skull was thickened, the dura adherent, and a spicula of bone, one-fourth inch long, projected into the brain, which was at this point in a state of cystic degeneration. Part of the trephine-opening communicated with the frontal sinus. The result is not stated.

A case is reported by Lathrop,¹¹²_{June} in which a boy aged 5 years was struck on the back of the head by the handle of a windlass; he became unconscious, and was confined to the house for some weeks. Two years afterward he had a violent convulsion, and from this time on, for thirteen years, he was more or less subject to such attacks, no treatment giving him more than temporary relief. At last, when 20 years old, he went into the Wilkesbarre Hospital, where he was at first very violently and frequently convulsed, but became better under the use of *veratrum viride*, 10 drops of the tincture being given every hour. He now spoke of a severe pain in the back of his head, occurring after each attack. An operation was performed by Guthrie, three buttons of bone being removed at the site of the old injury; each of these showed signs of fracture on its under surface, and the dura beneath was somewhat congested. A small drainage-tube was left in for twenty-four hours; the wound healed in four days, and he had no further trouble. Unfortunately, he had to leave the hospital for insubordination, about two weeks later, and was lost sight of.

A curious case is reported by Tansini.³³⁶_{Oct. 3} An actor 21 years old had had, in his ninth year, an injury of the head, followed by a difficulty of speech, especially in regard to words beginning with *b* or *l*. There was a scar in the fronto-parietal region, near the outer end of the fronto-parietal suture. Trephining was performed over the posterior part of the third convolution. Striking variations were noted in the thickness of the removed button of bone; the dura was slightly adherent. Improvement in speech began on

the fourteenth day, and continued progressively up to the time of the report.

In a case reported by Schwartz,⁸ a man 42 years old had had, many years before, a fall on the right temple. After a pleurisy, which left a vomica, he had convulsive crises, with loss of consciousness and biting of the tongue, and, finally, with (left?) facial paralysis. These crises continued to occur for ten years, and were then very frequent; his memory was enfeebled and his gait staggering. A cortical tumor of the right hemisphere being suspected, trephining was done at a point in the right temporal region, where there was a yielding of the bone, and the opening enlarged to about twice the size of a five-franc piece. The dura looked healthy, but did not pulsate; it was incised, and a resistant mass was perceived in the substance of the brain. This was punctured at two separate points, but no fluid issued, and the dura and wound were closed. On the third day the patient died of diffuse cerebritis. The case is recorded as a fresh instance of the difficulty of diagnosis in such disorders, and of the gravity of the operative procedure.

Hammond⁹ reports a case of epilepsy in a man aged 41 years, who had been struck with a stone on the right parietal bone thirty-three years previously. He had had, at times, curious seizures, in which he lost his identity and did things in a perfectly rational manner, but forgot them on returning to himself. An operation was performed, and a depressed portion of the right parietal bone, near its posterior superior angle, was removed. The patient was relieved, and had neither pain nor epileptic seizure for three months, but after that the symptoms returned and he relapsed into his former state. Hammond suggests that it might have been better if the surface of the exposed convolutions of the brain had been pared off.

In another case, that of a girl 3 years old, there was epilepsy of a year's duration, with loss of speech. She had, in infancy, fallen from the nurse's arms, striking the left side of her head. Trephining was performed over the posterior part of the third frontal convolution; the bone removed was one-fourth inch thicker than usual; the dura seemed healthy. Perfect success followed, the child having had no seizure for two years afterward, and being able to speak as well as any child of her age. Benda³⁴ has re-

ported the case of an artilleryman who was thrown from his horse, striking on the left side of his head. A year and a half afterward he suddenly lost consciousness, while riding, and from that time was subject to attacks of giddiness and faintness, with hysterical symptoms and alternations of tearfulness and apathy. Later, he had epileptic seizures, beginning with twitching in the right great toe. These were attended with depression and hallucinations, and after them the right foot was lame. An operation was performed, after the method of Wagner, a flap of skin and bone being turned up (the bone being chiseled) about the size of the palm of the hand. The dura being laid aside, the brain-substance was tested with the electric wire, to find the motor centre in which the twitchings of the toe arose. This being found, a portion of the cortex, as large as a tenpenny piece and some millimetres thick, was excised; it showed no gross appearance of disease. The wound was closed; some temporary paresis of the right arm and leg ensued, but five months later the man was quite well, except slight weakness of the right arm and some inability for prolonged mental effort.

In a case of Jacksonian epilepsy reported by Angell,¹_{Apr. 18} the signal symptom being in the right thumb, the left motor area of the face, arm, and a portion of the leg was exposed; by faradization the centres were distinguished, and at one point a seizure was induced; the arm-centre and a portion of the face-centre were carefully dissected out; the buttons of bone were replaced and the wound closed, with drainage. The patient, a boy aged 13, reacted well, with a few slight seizures; voluntary control of the arm was lost. About the fifth day there was a free discharge of subarachnoid fluid, and two days later a severe seizure, the temperature rising to 105° F. (40.6° C.). The wound was opened; one of the buttons of bone was found loose, and was removed; a hernia cerebri had appeared, which it was sought to correct by pressure. The patient, however, passed into a typhoid state, and died on the twenty-fourth day, the temperature having reached 106.5° F. (41.4° C.). An autopsy showed extensive inflammation of the brain and meninges; the muscles of the right arm were in a state of marked atrophy, measuring one inch less in circumference than the left. The author attributes the fatal result of this case to the hernia cerebri, which, he thinks, brought on the menin-

gitis. But as it is stated that beneath the trephine-hole there was a cavity in the softened brain-substance, communicating with the left ventricle, and that the cortical substance throughout the convolutions of the left hemisphere was atrophied, particularly in the motor zone and frontal lobes, it seems to me that the protrusion was a mere incident, and not an important factor. It is, indeed, not easy to determine the date at which such atrophic changes may have begun, or the amount of their influence as causative of the epileptic seizures, and it is quite possible that in this case there was a genuine typhoid or enteric fever, masked, but intensified by the head complication, and that that fever was the real cause of death.

A case of traumatic epilepsy, successfully operated upon, is reported by Cant.⁶ The patient, a robust man 34 years of age, was kicked by a horse in the right temple; six days afterward he had two fits, and three more after his admission to hospital. Next day he had eight attacks between 5 and 11 A.M.; they began with twitching of the left side of the mouth, then of the left hand; this was followed by opisthotonos, somewhat intermittent; the right hand was then applied to the corresponding side of the head, where a tender spot was found later. Such attacks continued to occur for a fortnight, in spite of treatment; the man lost flesh and became very weak. After about two weeks the seizures changed their character: he would become unconscious, his eyelids twitching, and, if touched, would spring into a sitting position, snarling like a dog, and trying to bite. The symptoms pointing to a discharging cortical lesion in the facial centre on the right side, the motor area was mapped out according to Reid's rules, and a circle an inch in diameter was marked, having its central point two and one-fourth inches behind and two and one-half inches above the external angular process. Next day anæsthesia was induced with the A. C. E. mixture and a trephine applied, with its pin at the centre of the circle above mentioned; the bone being removed, the dura bulged at the posterior part of the opening; it was divided, and a quantity of yellowish serum escaped from beneath the arachnoid; a black substance was seen beneath the pia, and, upon exposure, was found to be two small blood-clots in the gray matter; these were removed. Exploration was made, with an aspirator-needle, for pus, but none was found; nor was anything

disclosed upon enlarging the trephine-hole three-fourths of an inch backward. The wound was closed and dressed, and, with the exception of one slight attack of twitching of the left side of the mouth, there was no drawback to convalescence. Six weeks after the operation the man left the hospital in good flesh, health, and spirits.

In a case of compound comminuted depressed fracture of the right parietal bone, reported by Arnison,^{July 11} trephining was performed and a number of spiculæ removed, which were projecting into the brain-substance. On the fifth day, after some excitement, an epileptic seizure occurred, with wrist-drop and paresis of left arm and leg. Nearly five months later the man returned to the hospital, the fits having repeatedly recurred. A second trephining was performed at two points; two spiculæ of bone were removed; the middle meningeal artery was divided, and bled so freely as to require tying. Recovery was rapid, and only one or two slight seizures were noted, at long intervals, afterward.

Two cases of Jacksonian epilepsy,—one, from hereditary syphilis, in a sailor 30 years old; the other, from traumatic cause, in a mason aged 22,—and both of which were successfully treated by trephining, are reported by Lampiasi.^{673 Jan.}

Vaslin^{Aug. 15} reports a case of traumatic epilepsy cured by trephining. The injury—a depressed fracture of the skull—was sustained in infancy, and non-union ensued. When all danger was supposed to be past the attacks came on, and augmented in severity as the child grew,—a fact attributed to pressure upon the meninges and brain by the disjoined fragment, the neighboring bones surmounting it and developing upon its surface.

Two cases of traumatic epilepsy, successfully treated by trephining, are reported by Tansini.^{336 Oct. 2} In one, the patient was a boy aged 14; in the other, a girl aged 11.

Caselli^{589 Jan. 27} reports a case of cortical epilepsy of traumatic origin, in a young man aged 17, in which trephining was performed, the periosteum being preserved in its natural relation with the button of bone, which was replaced. The operation was followed by complete relief to the epilepsy, and it is stated that there was also a mental and moral regeneration of the patient, who is said to have “seemed a different being” afterward.

OPERATIVE SURGERY OF THE BRAIN.

Broca³_{Apr. 1} gives the following as the three classes of indications for trephining: (1) we may be guided by external lesions, as in the case of traumatism; (2) we may seek for a cerebral lesion, of known or unknown nature, the situation of which is diagnosed by the symptoms induced, in the light of our knowledge of the functions of different portions of the brain; (3) we may operate without being so guided, when the nature of the lesion has been determined, from experience as to the usual seat of such lesions, and of the best way to approach them. The use of the chisel instead of the trephine in the surgery of the head, and especially in the treatment of fractures of the skull, is advocated by Keetley.²²_{Dec. 21, '90} He would restrict the employment of the latter instrument to cases where it is desired to make a large hole in the skull-cap. As to the usual objection to the chisel, on account of the concussion produced by the blows of the mallet, he thinks it holds only in old people with very atheromatous arteries.

Gerster¹_{Feb. 21} expresses the opinion that the trephine is always an inadequate instrument, and that its use is fraught with danger to the dura. He employs the chisel, and replaces the removed chips. In connection with a report of a case of traumatic epilepsy, twice operated on by him, Weir¹_{May 16} speaks very favorably of the re-implantation of the bone-discs, which he found not only to adhere and live, but to be partially absorbed; so that there was no risk of undue pressure on the brain. In another case the re-implanted discs and chips wholly disappeared.

Hinterstoisser¹¹²_{Aug. 8} recommends the use of a celluloid plate for insertion in place of bone removed by the trephine, and gives a case in point. The celluloid is to be washed carefully with soap and water, soaked for twenty-four hours in a 1-per-cent. sublimate solution, and then kept in a dry state.

Keen⁶¹_{Aug. 8} reports a second linear craniotomy in the case of microcephalus before recorded by him, and 2 additional cases of his own, aged 19 and 16 months, respectively. In one, the result was fairly satisfactory; in the other, the child died, apparently from heart-failure, an hour and a quarter after the operation. A number of operations by other surgeons are also reviewed.

According to a report made by Lannelongue,²_{Sup., June 6} he has operated twenty-five times for microcephalus by linear craniot-

omy (miscalled *craniectomy*). One patient died in forty-eight hours; all the rest recovered from the operation, and most of them showed marked improvement. He said that he had sometimes made the section of the bone parallel with the longitudinal sinus, posteriorly between the lateral sinus and the occipitoparietal suture, or transversely in the frontal bone, dividing the longitudinal sinus; sometimes, on the other hand, he had performed what he calls *craniectomie à lambeaux*, making bony flaps of various shapes, like a **U**, a **V**, or a **T**, or sometimes rectangular. The dura was only divided when it was found that pachymeningitis existed. Resection of the periosteum Lannelongue regards as unnecessary. Ransohoff⁹_{June 13} records the case of a girl, 3 years and 7 months old, on whom linear craniotomy was performed by him for microcephalus, with a gratifying degree of success, as noted three and one-half months later. It seemed that, in the process of ossification, the left parietal bone had overlapped the right; the left arm was less frequently used than the right, and its range of motion was less. As to the operation, it may be noted that the Esmarch band was employed to control bleeding from the scalp, and that the division of the skull was carried from the lambdoid suture to within $\frac{1}{2}$ inch of the orbit; it was $\frac{3}{8}$ inch wide and 6 inches long, including the trephine-hole. A strip of periosteum, corresponding to the slit made in the bone, was removed. The right side of the head was operated upon. At the date of the report, the biparietal diameter was increased from $4\frac{6}{8}$ inches to 5 inches; the bifrontal, from 3 inches to $3\frac{3}{8}$; the measurement across the vertex, from one ear to the other, from $9\frac{1}{4}$ to $9\frac{3}{4}$ inches. The left arm was freely moved and used, and mental action was clearly present. Anger³_{Apr. 1} reports a case in which linear craniotomy was performed upon a girl aged 8, who had made no progress mentally since her eighteenth month. She had no language, no idea of avoiding danger, nor of propriety; she kept her head down, and could not look steadily at anything. Until within a year, she had been liable to severe and frequent nocturnal "crises." The head was tolerably well shaped, but somewhat flattened on the left side. The operation was therefore done on this side, in the usual way. The opening made in the skull measured $11\frac{1}{2}$ centimetres in length by 4 centimetres in width; the dura bulged, and was punctured with a Pravaz syringe, but no liquid escaped.

On the next day the child no longer soiled her bed; in a few days she asked for food, and cried for her father and brother; began to look steadily, to control her limbs, and to walk. The improvement progressed after her return home.

A case is reported by Maunoury,⁸_{Apr. 1} in which he performed linear craniotomy, upon a girl 4 years old, for microcephalus. The division of the bone was eleven centimetres in length,—from the lambdoid suture to the coronal; the result obtained seemed to be perfect, but the improvement lasted only three or four months, when the child relapsed into her former condition of idiocy. In another case the same surgeon made a larger section, but the child died in convulsions twenty hours afterward. Maunoury dwells upon the liability of the patients to relapse, and remarks, also, that it is difficult to say, when success is attained, how far the credit belongs to the operation and how far to educational measures. Another case, in a child only 5½ months old, in whom the improvement lasted only forty-eight hours, is reported by Larabrie.⁸_{Apr. 1} All the symptoms recurred; the child failed steadily, and died five weeks after the operation was performed. Two cases of microcephalus, treated by linear craniotomy, are reported by Horsley.²_{Sept. 12} In 1 case—that of a boy aged 3—a decided improvement was manifest at once, and became more marked as time went on. In the second case,—that of a boy aged 7,—besides the usual phenomena of microcephalus, there had been “fits” since he was about 7 months old; during the operation the pulse became weak and irregular, and the breathing quickened, the temperature rose, and death ensued in three days. This fatal pyrexia is ascribed to injury of the thermotaxic centres. McClintock⁶⁵_{Sept.} records the case of a microcephalic girl, 3 years and 8 months old, upon whom he operated,—dealing with both sides of the skull, by a double groove on each side, making two large tongues of bone, which were then pulled up with the fingers. Great improvement is stated to have ensued. In a case recorded by Cerné,²⁰³_{Oct. 15} a child 3 years and 3 months old was operated on, with a result which, at the end of a year, seemed perfectly satisfactory.

A remarkable case is recorded by Prewitt,⁸²_{Feb. 14} in which a girl aged 7 was struck on the head at the junction of the sagittal and lambdoid sutures, and was unconscious for three hours. Previous to this, and afterward for six years, she had conjunctivitis; at 14

years she had measles, and became blind in the left eye. After this she was subject to occasional headaches, which grew more frequent and more violent, and at length were accompanied with vertigo, nausea, and unconscious spells. The right eye now became occasionally blind, and finally the sight in it was lost entirely. Both eyes were normal when examined with the ophthalmoscope. The headaches continuing, she was, at the age of 23, trephined at the seat of the old injury; the skull was found to be thickened, and, on raising the dura, a quantity of subarachnoid fluid escaped. On the same day it appeared that the sight of the left eye, lost for nine years, was restored, and it remained good. The pain in the head was relieved in a marked degree, but was readily increased by fatigue or excitement. Hammond⁹_{Oct. 21} relates the history of a case in which a man 21 years old was struck by a stone in the right frontal region, about an inch above the supra-orbital ridge, causing a cicatrix and a depression of the bone. Seven years later, having suffered from severe occipital headache, with occasional attacks of vertigo, he was trephined at the seat of injury, and a spicula of bone was found at the under surface of the removed button; there was a mass of very vascular membranous (*sic*) tissue connected with the dura; this was detached with the fingers and the knife-handle, and the wound was closed. Two weeks afterward he returned home, relieved, and two months later he reported that the improvement had continued, the pain having disappeared, and his condition so good that he proposed to resume active business.

A case reported by Bullard and Bradford⁹⁹_{Apr. 30} is worthy of special note. The patient, a girl aged 6½ years, presented symptoms of a tumor in the cerebellum, and an operation was undertaken. An incision was made from one mastoid process to the other, curving upward as far as the superior curved line; the flap thus marked out was rapidly dissected down, the pericranium being taken along with it. One or two small foramina gave out blood, and were plugged; but when the median line was reached a larger opening was met with, the flow from which was so profuse as to cause death in a few moments. This portion of the bone being removed with a large trephine, the orifice was found to communicate directly with the junction of the sinuses, at the point known as the torcular Herophili. There was no evidence of disease of the bone, and the opening was clearly not due to erosion

by pressure outward of the tumor. On enlarging the trephine-hole with forceps, the tumor was found as a large, cheesy mass, projecting at the right side of the cerebellum. A careful examination of the bone was made, and it seemed that there had been a defect of ossification around the small veins communicating with the sinuses. The authors discuss at some length the subject of cerebellar tumors, and the paper is well worth consultation. During the discussion, Bradford remarked upon the advantages of chloroform over ether in these operations, and upon some points in the technique. But 4 instances, only 1 of which was successful, have

EXTERNAL AND INTERNAL SURFACES OF BONE.
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been hitherto put upon record. Manley¹⁸⁹ mentions a case of depressed fracture, close to the torcular Herophili, in which trephining was done. Upon the removal of the disc and the careful elevation of some depressed fragments, an uncontrollable gush of blood ensued and in a few moments the patient was dead.

D. Tait⁷⁷ records the case of a man who, in 1873, was knocked down and run over in the street. A fistulous orifice remained in the region of the right external angular process of the frontal bone, near which there had been a small scalp-wound. On the closure of this orifice he always had intense cephalalgia. In June, 1890, a sinus leading from the orifice was laid open, and at the anterior inferior angle of the parietal bone a ragged perforation in the skull exposed the dura,—thickened, vascular, and bathed in pus; some distance farther back a sequestrum was felt with a probe. At a second operation, the incision was prolonged backward; a trephine-hole was made at either end of it, and the intervening bone was removed by means of Hey's saw; a loose sequestrum, one-third by one-half inch in diameter, was found and taken away, and the dura was curetted; the wound was packed

with iodoform gauze, and next morning the dura was again curetted, after which the wound was closed; but the curetting of a sinus had to be repeatedly resorted to before healing was obtained. Recovery was perfect. This operation is entitled a "craniectomy," but it is difficult to understand why this very incorrect term should be used for what was really only an extensive trephining.

Two cases are reported by Wagner⁷⁰_{Apr. 19} in which he performed temporary resection of the cranium, according to the method proposed by him, and detailed in the last issue of the ANNUAL. One of the patients was a girl aged 7; the other, a boy aged 3. In the former there was an arrest of cerebral development, with convulsions, following a fall on the head in infancy; in the latter, a like condition, probably from injury by the forceps during delivery. In both the operation itself was satisfactory, but in the second the therapeutic effect was *nil*. In commenting upon this report, the objections are made: that this method involves the risk of necrosis and suppuration of the bony portion of the flap; that, if the flap raised is large, the operation is difficult and dangerous, and that the loss of bony covering to the brain in ordinary trephining is a matter of no importance; and, finally, that the violence inseparable from the use of the chisel is likely to injure a brain already threatened with inflammation from a damage sustained by the skull.

A very interesting case is reported by Hammond,⁹_{Oct. 21} in which a man aged 28 presented symptoms of left hemiplegia, epilepsy, and imbecility, due to cerebral syphilis, and set aside by iodide of potassium, hot douches to the spine, and electricity. Two months later he had a relapse; large doses—200 grains (13 grammes) thrice daily—of potassium iodide giving no relief, an operation was decided upon. The cranium was trephined at a point to expose the right ascending frontal and parietal convolutions; the dura was laid open, and the membranes seen to be opalescent, a small quantity of serous fluid escaping; no indications of a growth appeared. Improvement began at once, and about two months later, it is stated, the patient returned to his home as well as he had ever been in his life.

The surgical treatment of general paralysis of the insane is again discussed by Shaw.²_{Sept. 12} He states that it rests upon two grounds: general, in relief of pressure and draining away of

accumulated fluid; and special, in the hope that it may afford a new system of nutrition for the brain and a new channel for the escape of waste products. These positions are defended on theoretical principles, and 3 cases are related in which there was relief to headache and mental improvement. As to the prolongation of life, in 1 case death occurred seven months and in another a year and one month after the operation; the third was only of very recent date. From the report of the discussion on this paper in the Section on Psychology of the British Medical Association, it does not appear that the members generally were strongly impressed with the value of the proposed operations.

Rey³_{Sept. 30} thinks that injuries of the skull have much to do with the causation of general paralysis, and cites a case in which this affection manifestly ensued upon a fracture of the frontal bone badly united. He asks whether operation might have relieved the cerebral symptoms, as in a case under the care of Pantaloni, where there was depression of the parietal bone. He argues that, in the early period of general paralysis, the intense congestion increases the volume of the brain, as well as a diminution of the endocranial cavity, by thickening of the bone. The removal of the resulting compression by an opening at some point may set aside some of the general phenomena. But, in confirmed cases, surgical interference would be powerless to hinder the changes due to chronic meningo-encephalitis.

A case is reported by Schönborn³⁸⁶_{No. 26} in which a large defect of the skull at its anterior part, due to an injury, was repaired by König's method of transplantation of a flap, consisting of skin, peritoneum, and the outer table of the cranium. Four months later, the flap having become firmly adherent, but being unsightly from the growth of hair upon it, the skin was again dissected up and returned to its place on the scalp; the raw surface left was covered by skin-grafting by Thiersch's method. In connection with this case 2 others were mentioned,—one by Wolff, and the other by von Eiselsberg. A case is recorded by Ricard,¹⁰⁰_{July 22} in which he removed a large portion of the frontal bone, on account of a sarcomatous growth, and filled up the gap in the skull by implantation of the iliac bone of a dog. Union took place at once, and was firm three and a half months afterward.

A case in which the "temporary resection" of a portion of

the skull—recommended by Wagner (see ANNUAL for 1891)—was successfully performed is reported by Mellinghoff.¹⁶⁹ Keen⁷⁶⁰ records a fatal case of pyæmia and thrombosis of internal jugular vein from old otitis media. The patient, a man aged 31, had had discharge from the right ear for seven or eight years, with slight deafness. After a severe application to the ear, he had great pain and headache, chiefly occipital; then came violent chills, slight jaundice, hæmoptysis, and symptoms of right-sided pleurisy. When seen by Keen, there was some mastoid tenderness, very fetid discharge from the ear, and slight swelling of the side of the neck, with hoarseness and dysphagia. As the only hope, the treatment recommended by Ballance (see ANNUAL for 1891, vol. iii, A-16) was adopted. The mastoid process was trephined and the lateral sinus exposed by chiseling, when it was found in a state of septic inflammation; the jugular vein was next exposed, by dissection through the altered tissues, and tied as low down as possible,—about an inch and a half above the clavicle. It was found full of very fetid clot. Only blood came from the sinus when it was opened. The patient did well for about twenty-four hours, but then dyspnœa came on, either from extension of the clot or from embolism, and death occurred within an hour. No autopsy was made. Pearce Gould²² is reported to have adopted this method recently in the case of a man aged 30; the result is not stated.

The anatomy of the mastoid region, with reference to surgical operations, has been studied by Birmingham.¹⁶ From an examination of 100 specimens, he points out that the floor of the cranial cavity (middle fossa) may be at a variable height above the level of the upper margin of the bony meatus. A point immediately behind the meatus, and below the level of its upper border, will always correspond to the position of the antrum, which may be entered by a drill (in preference to a trephine), passed straight inward for perhaps three-fourths of an inch. The instrument (one-fourth to one-third of an inch in diameter) should be applied as near as possible to the back of the bony meatus, and its upper side not more than one-twelfth of an inch above the level of the superior margin of that canal. The lateral sinus, it would seem, presents considerable variations in its course and shape. In average cases it begins near the occipital protuberance, and runs forward and upward, close to the superior curved line, for a short distance; then,

leaving this and arching farther upward to nearly three-fourths of an inch above Reid's base-line, it turns more or less sharply downward to the mastoid, passing about one-half of an inch behind the external meatus; reaching a point about one-sixth to one-fourth of an inch below the level of the floor of the meatus, it turns into the base of the skull.

In order to expose the sinus—as in cases of septic thrombosis—Birmingham advises that the pin of a three-fourth-inch trephine be placed at a point one and one-eighth inches behind the centre of the bony meatus, and on the level of its upper border. To reach the temporo-sphenoidal lobe—as in cases of abscess—the instrument should be applied one and one-fourth inches behind and one and three-fourths or (better) two inches above the centre of the meatus; to get at the cerebellum,—one inch below Reid's base-line and two inches behind the centre of the meatus. The fact is mentioned, that the course of the lateral sinus downward on the mastoid process corresponds somewhat accurately to the line of reflection of the skin from the head on to the pinna.

FRACTURES OF THE VAULT OF THE SKULL.

An unusual case is reported by Munn.¹⁶¹_{Sept.} A young man, 18 years of age, was caught between two locomotives, and sustained two compound depressed fractures of the skull,—one near the right frontal eminence, the other at the right occipito-parietal suture. When seen, six hours later, he was conscious, though dazed. Trephining was done at the posterior fracture, and the whole of the depressed area—about two square inches—was raised; a small extra-dural clot was removed, as well as some pointed fragments of bone. The anterior fracture was next attacked, and the trephine applied, although the degree of depression was very slight; a sharp splinter of bone, three-fourths of an inch long and one-fourth of an inch wide, was found pressing upon the dura, and was removed. Drainage was used in the dressing of the posterior wound. The patient did very well, and was allowed to go out on the fourteenth day. Manley¹⁹_{Aug. 20} reports a case of depressed fracture in the right temporo-parietal region, in a boy 9 years old, who had fallen a distance of forty feet; fracture of the base anteriorly was also diagnosed. No operative interference was resorted to, and the boy was doing well on the eighth day. Manley thinks that the vas-

cularity of the bone and pericranial tissues in children, and their liability to meningitis and cerebritis, should require us to abstain from operation in such cases, unless the indications for it are very clearly imperative. A case is recorded by Maxwell,⁹⁹⁸_{Oct.} in which a child had paralysis of the left hand and arm, and slight ptosis on the same side existed, as the result of a depressed fracture of the right parietal bone, caused by the use of the forceps in delivery eleven months previously. Trephining was performed, two buttons, an inch in diameter, including the depressed portion, being removed. The buttons were replaced; immediate improvement was noted, and continued to advance. Hermes,⁶⁹_{Feb. 26} reports the case of a boy 6 years old, who was struck with a hatchet and was brought into hospital unconscious. In the parietal region there was a wound five centimetres long, which was enlarged, and a piece of the bone nine centimetres in length, six centimetres wide at the posterior end, and two centimetres at the anterior was found quite loose; it was therefore removed; healing took place perfectly in a month and a half. The child was, for the first ten days, in an apathetic state, but otherwise unaffected mentally.

In a case under the care of Cheyne,⁶_{Oct. 10} a boy 4 years old had fallen fifteen feet, striking the left side of his head. He had sickness and vomiting, pain in the head, loss of appetite, and constipation for three days, when twitchings of the eyes and hands appeared. The right pupil was dilated, the left normal; no facial paralysis; the twitching affected the left side of the face and the left hand and arm, the leg more slightly; sometimes the right arm and leg, also, were involved. Trephining was performed at the seat of injury, and a fractured and depressed portion of bone was raised; after which the irritation was relieved, but there was, for a time, motor paralysis of the left arm and leg. No explanation of the occurrence of the symptoms on the side corresponding to the injury is apparent. Dewey and Riese²⁷⁸_{Jan.} report fully a very curious case, in which a man aged 20 struck his head against the lintel of a low door. About ten days afterward he showed signs of insanity, and soon had to be placed under restraint. He had suicidal tendencies, and, twenty days after his admission to hospital, a sore in the scalp at the vertex was examined, when the head of a nail was discovered. Two days later this nail was extracted, with some difficulty, and was found to be two and nine-sixteenths inches in

length. It had been driven in close to the left of the median line, three inches posteriorly to the coronal suture, downward and forward, at an angle of about 40 degrees from the perpendicular. The man became very ill, and there were evidences of aphasia. Some pus had followed on the withdrawal of the nail, and, two days later, trephining was performed. All the symptoms progressed, and death ensued in three days. At the autopsy cerebritis and suppurative meningitis were disclosed. It seems certain that he himself drove the nail in, during the period before his admission to hospital, while he was living alone on his farm.

Hammond⁹ reports a case of right-sided paralysis in a man aged 35, who had a large depression of the bone at the left parietal eminence, said to be due to a sabre-stroke received during the war. (The man could have been only 11 years old when the war ended.) Trephining was performed, and the depressed bone, with a number of spiculæ and fragments on its deeper surface, was removed. A good deal of improvement was manifested and continued for four weeks, when the patient went home, against the surgeon's advice. A few weeks later he relapsed into his former condition. Taylor,⁹ reports a notable case, in which a man aged 35 was struck with a pick, comminuting the bone at a point two inches above the glabella and about one-half inch to the right of the median line. On enlarging the wound under ether, it was found that a fragment of the bone had opened the longitudinal sinus, and the bleeding was profuse. As packing did not control it, the wall of the sinus, including the orifice, was caught up with a pair of hæmostatic forceps; the torn dura was sutured and the wound dressed. After seventy-two hours the forceps was removed, and no hæmorrhage followed that was not easily checked by packing with iodoform gauze. A period of intense cerebral irritation followed, but subsided. The man gained strength, his mind cleared up, and on the sixty-fifth day he was discharged, cured, to return to his work.

A remarkable case of recovery from extensive fracture of the frontal bone is recorded by E. W. Smith.⁶⁶³ The patient was a lad aged 17, a miner, who was caught by a fall of top-coal, and his head forced against the corner of a mine-car.

A case of very severe compound comminuted fracture of the left side of the frontal bone is reported by Jollye.⁶ Besides a

number of small fragments, two large ones were wedged down, so that a small trephine had to be applied. One triangular piece, an inch wide at the base and one and one-fourth inches long, was removed. The anæsthetic used was methylene. The brain was deeply wounded, and the dura too ragged to be sutured. A drainage-tube was left in the hole in the brain. Rigidity of the arms and legs, marked before the operation, continued for some time afterward. Recovery was slow, weakness of the left leg persisting when he was discharged from the hospital. Eighteen months or more after the injury he was seen, and seemed to be

PIECE OF SKULL REMOVED.

APPEARANCE AFTER RECOVERY.

(Medical Mirror.)

quite himself, having been at his usual work for that length of time.

A case of very severe compound comminuted fracture of the upper part of the frontal bone, in which trephining was postponed until the seventh day, and then done with success, is reported by Morgan.⁸¹ Two cases of compound comminuted depressed fracture of the parietal bone are recorded by Baines.¹⁸⁷ In one, operated upon on the third day, the man being in a state of coma, no reaction took place, but death ensued in twenty-four hours, the temperature having run up to 104° F. (40° C.); in the other, operated upon immediately, a good result was obtained, although there was reason to believe that one of the fragments of bone had wounded

the longitudinal sinus. A severe case of compound comminuted depressed fracture of the parietal region, successfully trephined, is reported by Hulke, ⁶_{July, 4}, and another by the same surgeon. ⁶_{July, 11} Several cases of compound comminuted fractures in children, successfully treated by trephining, are reported by Xanten, ¹⁰⁵_{Aug. 1} by McDowell, ⁸⁴⁹_{Sept.} and by Bulluck. ⁴³_{July} A singular instance of a dagger wound of the skull, penetrating the left side of the head to the depth of twelve centimetres (four and three-quarter inches), is reported by Marin. ⁶⁷⁸_{Sept.} Another remarkable case of recovery from a severe hatchet wound of the occipital region, separating a large portion of the bone and exposing the dura, is recorded by Dewey and Riese. ²⁷⁸_{Jan.}

FRACTURES OF THE BASE OF THE SKULL.

From a review, by Bouqué, ⁴⁵⁴_{Jan.} of an article by Deroubaix, it appears that this surgeon indicates some important diagnostic marks of fractures of the base. In such a case, on examining the palate, it will be seen that the uvula is drawn to one side, and that the other half of the soft palate is flaccid; the attempt to swallow a mouthful of liquid will be found to be attended with difficulty, and to provoke cough. Further, from consideration of the anatomical relations of the nerves which pass through the substance of the bone, Deroubaix points out what deductions can be drawn from the impairment of their functions as to the seat of fracture in any given case. He regards the flow of serosity (subarachnoid fluids) from the ear as very rare; in order to its occurrence, the serous sheath of the auditory and facial nerve must have been opened, at its point of reflection in the depth of the internal auditory meatus, and a channel formed thence, by the fracture, to the external meatus. When a like flow occurs from the nose, it is probably due to a fracture of the ethmoid, with tearing of the arachnoid sheath of the olfactory nerves. The prognosis in fractures of the base is much more often favorable than was formerly taught; some surgeons of the present day even assert that there are more recoveries than deaths. But it is well to be very guarded in holding out hopes; a case of Uytterhoeven's is cited, in which the patient, almost entirely well, except a slight deafness, demanded his discharge, but was kept in the hospital, and a few days later was found dead in his bed.

A case of wound of the anterior lobe of the brain—by the end

of an umbrella-stick thrust up through the roof of the orbit—is reported by Polaillon.¹⁰ Aug. 4 The patient, a boy aged 18, was found in a state of coma; the foreign body had been withdrawn with much difficulty. An incision was made in the forehead and a portion of the frontal bone chiseled away; the dura was incised and some blood and cerebro-spinal fluid escaped; five splinters and a portion of damaged brain-substance were removed, and a small artery was tied with catgut; the *débris* of the eyeball was enucleated, and a drain was placed in the frontal wound, coming out through the orbit. The patient became conscious in a few hours, and had no bad symptoms afterward. Next day the drain was taken out and replaced by two,—one in each wound. Healing took place well and quickly.

A notable case is recorded by Smart,³⁶ Aug. in which a woman aged 45 was struck on the right side of the head, and had left hemianopsia, left hemiplegia, and, later, coma, with Cheyne-Stokes respiration. Trephining was done at the point of injury, and a little lower also; there was free hæmorrhage from “the membranes;” the dura was incised, and the breathing was at once relieved. The woman made a good recovery, but the hemianopsia and hemiplegia remained unchanged nine months after her discharge from the hospital. Hulke,⁶ July 11 records a severe case of fracture of the base, involving the anterior and middle fossæ, and probably the posterior also; there were evidences of injury to the fifth, sixth, seventh, and ninth cerebral nerves. The patient, a man aged 54, made a very good recovery, but left the hospital, fifty-four days after the accident, with paralysis of the parts supplied by the above-mentioned nerves, and with “neuralgic” pains on the corresponding side of the head. Two other cases, in which like injury was suspected, but the positive diagnosis was not made out, are reported by the same surgeon.⁶ July 18

A case in which the lateral sinus was wounded has been placed upon record by Genouville.⁷ June 26 The patient, a boy 9 years old, was kicked by a horse at the postero-inferior angle of the right parietal bone, and had a compound depressed fracture; brain-substance escaped from the wound, and there was epistaxis. Forty-eight hours after the accident, the child being still in a state of coma, with a temperature of 99.3° F. (37.35° C.), the scalp was incised, and an enormous splinter, comprising the lower fourth

of the parietal bone, was removed; the wound was instantly flooded with black blood, but the flow was easily arrested by a tampon of iodoform gauze. The wound was, however, already infected, and death ensued, six days afterward, from meningo-cerebritis, left facial paralysis and contractures of the left upper and lower limbs having occurred. At the autopsy the wound of the sinus was seen to be four or five millimetres in length, parallel to the axis of the sinus; the splinter which caused it contained part of the beveled edge of the parietal, which had slid down along the inner face of the squamous portion of the temporal; until its withdrawal it had acted as a plug to the orifice, and prevented the escape of blood.

Cases of recovery from fracture involving the base of the skull are recorded by La Fevre⁵³_{Feb. 7} and Houzel.⁸_{July 1} In 3 other instances, recorded respectively by Farrar,¹⁹⁶_{Aug.} by Schofield,²_{Mar. 21} and by Cazenave,⁷_{June 26} death ensued from meningo-encephalitis. Schofield's case presents some curious features. It concerned a boy aged 6, who, while at school, fell forward from a form onto a wooden floor. He returned home at 5, made some complaint of not feeling well, but ate something, and went to bed at 7; at 8 he was delirious, and at 9 became comatose; an hour later he died. Some thin, clear fluid was flowing from the right ear and a little from the nose. An autopsy revealed a fracture involving the right posterior fossa, in which there were about 2 fluidrachms (7.5 grammes) of blood; no other lesion could be discovered. The youth of the patient, the slightness of the accident, the rapidity of the succession of symptoms and of the fatal issue, and the small extent of the actual injury make this a peculiarly notable case.

SHOT WOUNDS OF THE BRAIN.

An interesting article has been published by Bradford and H. L. Smith,⁹⁹_{Oct. 15} on penetrating pistol-shot wounds of the skull. The case of President Lincoln is given in detail, and a table of 91 others is presented, with an analysis. From this it appears that of the whole number 51, or a little over 56 per cent., ended fatally. When the bullet perforated or was removed, the mortality was but 33.3 per cent., as against 54 per cent. when it lodged and remained. The prevailing idea that wounds of the anterior portion of the skull and brain involve less risk than those

of other regions of the head is confirmed. But the paper is one which scarcely admits of an abstract being made. The authors pronounce decidedly in favor of trephining in these cases; of enlargement of the rent in the dura; of careful probing, and of irrigation. They regard the chances of successful removal of the bullet as but slight, and dwell upon the fact that other foreign bodies—splinters of bone, hairs, bits of clothing, etc.—are apt to have been carried in along with it.

Delbet and Dagron,^{7,12} record a series of experiments made by them as to revolver wounds of the skull. They imitated, as nearly as possible, the conditions of suicidal wounds, and state that the courses taken by the balls might be divided into four varieties: (1) a ball, after entering the skull, may lodge in the substance of one of the hemispheres of the brain; (2) it may traverse both hemispheres, and lodge at the opposite wall of the skull; (3) it may traverse both hemispheres, and, reaching the opposite wall without force enough to penetrate it, turn back, and, after a recurrent course of variable length, lodge in the brain-substance, (4) it may pass clear through. This latter class calls for no special consideration.

Out of 45 cases, the first course was followed in 5, the second in 14, and the third in 26. The length of the recurrent course varied from one or two centimetres to seven or eight. As to direction, it was, in 24 cases, almost exactly horizontal, and from before backward, obliquely. In 1 case it was nearly vertical, and in 1 very obliquely downward and backward. Almost always the dura was torn at the point of reflection of the ball; in 1 case there was an incomplete fracture of the bone, a prominence perceptible to the touch externally being formed. In 19 cases splinters of bone were carried in with the ball, and usually were scattered in the brain-substance. This latter fact seems to the authors to bear somewhat against the value of trephining, since some splinters, perhaps of large size, are likely to be left. Should there be symptoms of injury to motor centres if the ball has entered in the temporal region, the skull should be opened at the one situated highest and farthest back, because in these cases the ricochet was in this direction. It may, perhaps, be noted that deductions from the behavior of the tissues of the dead body cannot always be relied upon as exactly parallel to what would happen under like conditions in the living.

A case of severe gunshot wound of the frontal region—the iron breech-block of an old-fashioned, muzzle-loading gun being driven into the substance of the brain, and requiring great force for its extraction—is reported by Neiman.¹²¹ The patient, a young man aged 23, was only unconscious for a short time, and made a very good recovery, a few pieces of bone coming away, and the wound healing, with only a slight depression of the forehead.

A case of pistol-shot wound of the brain is recorded by Picqué.⁸ The wound was just at the roots of the hair, a little to the right of the median line; the bullet was at first supposed not to have penetrated the skull. Later, continued hemicrania led to a suspicion of cerebral abscess, and trephining was performed; the dura was found to be perforated, the brain-substance bulging into the hole; on enlarging this opening and incising the brain, a flow of pus occurred, but no ball could be found. Complete recovery ensued. A case of pistol-shot wound of the brain—the ball passing from about the left external angular process upward and backward, to form an abscess in the right posterior lobe of the cerebrum—is reported by Ruth.⁹⁹⁸ On the twenty-first day, the ball being located, trephining was performed; it is not stated that the pus-cavity was then detected; the ball escaped through the trephine-hole a few days later. Death ensued in nine days, from exhaustion. In a case of suicidal pistol-shot wound, reported by Snyder,⁶⁵ the bullet entered about an inch in front and two inches above the right ear, and divided into two parts,—one going across the brain and the other escaping through the scalp a little above the wound of entrance. There was at first partial and then complete paralysis of the left side, but on the right side there was spasm, with athetotic movements. On both sides the abdominal and cremasteric reflexes were abolished, but those of the knees were exaggerated, and there was a very slight clonus at each ankle. Death occurred forty-one hours after the shooting, the right side having become paralyzed; consciousness never was regained.

A singular case of suicidal pistol-shot wound is reported by Swain.² The patient stood before a looking-glass, turned his head far around to the left, and fired a pistol-shot into his head behind the right ear; the bullet passed into his mouth and he spat it out. Some bleeding occurred from both the external and the internal wound. The man began to suffer from a troublesome cough, with

bloody expectoration; his tongue was coated and drawn toward the right; he was slightly deaf in the right ear; he dragged his right leg in walking. Death occurred about a week after the injury, (the precise time is not stated), apparently from acute congestion of the right lung.

In a case reported by Fröhlich ³⁴_{Aug. 26} a student aged 21 shot himself, with a revolver, in the right temple; he was taken, insensible, to a hospital, and an unsuccessful search made for the bullet. He was treated for three weeks, and then discharged well, except for loss of the sight of the right eye. Nine months afterward he was attacked with violent pains in the head, and died in coma on the nineteenth day. An autopsy showed that the bullet had entered the orbit, torn away the optic nerve, and lodged on the under surface of the orbital plate of the frontal bone, where it was found imbedded in callus. Just over this point the dura was somewhat thickened, and a portion of the brain had undergone yellow softening. All the blood-vessels were full; the entire base of the brain on both sides, the cerebellum, medulla oblongata, and upper portion of the spinal marrow were bathed in pus; and the ventricles were full of purulent liquid, the lower layer of which was fibrinous. In a case of essential epilepsy, reported by Girard, ⁸_{Apr. 1} a woman aged 29 shot herself in the right temple, with a revolver. Trephining was performed; the bullet and some splinters of bone were removed, and the wound healed within a week. The day after operation the suicidal idea had disappeared, and the patient went on to complete recovery. At the end of five months she had not had an attack.

A remarkable account is given by Saxer ²¹⁴_{Sept. 15} of a case in which a soldier aged 20, in 1847, was struck by a musket-ball behind and above the left ear. A probe passed in along the wound seemed to enter the brain-substance; the bullet could not be felt. The wound remained open and suppurating for twenty years, the man complaining of great pain and weight in the side of the head, and often mentally deranged. Death occurred from pulmonary phthisis, forty-three years and some months after the receipt of the injury. The bullet was then found to have entered the cranial cavity, and to have turned sharply downward (it was a spent ball), lodging between the dura and the bone. The dura was closely adherent to it, and there was an irregular bony deposit around it.

SURGERY OF THE SPINE.

White⁸⁰ discusses the subject of spinal surgery. He thinks operative interference called for in cases of tuberculous disease, if the cord is pressed upon by pus, by carious or necrosed bone, or by pachymeningitis. The prognosis is favorable in proportion to the youth and strength of the patient, the absence of general tuberculosis, and the nearness of the lesion to the lower end of the column. Disease of the vertebral bodies may sometimes be attacked by removing the laminae, with the idea of not only relieving pressure, but taking away affected portions of bone or tubercular granulations. In cases of tubercle of the body of a vertebra and anterior pachymeningitis, the only advantage to be gained is the freeing of the cord from pressure. Operation is advised only in grave cases, where there is acute compression, with respiratory complications and rapid development of degenerative changes, or where a chronic case steadily progresses toward a fatal result. (These would seem to be the conditions under which most surgeons would feel special reluctance to institute operative procedures of so very serious a character.) As to traumatism, it is stated that some of the objections formerly urged against operation—hæmorrhage, the probability of destruction of the cord, pressure from inaccessible fragments of bone—have proved to be unfounded, and that the dangers of shock and of pyæmia have been done away with since the adoption of antiseptic methods. Recent experiences, the author thinks, should lead to more frequent operation: in all cases in which depression of the posterior arches is obvious; when, after fracture, there is rapid degenerative change; when the cauda equina is compressed; whenever there are the characteristic symptoms of spinal hæmorrhage. When the crushing force has been so great that the cord is probably disorganized operation is deprecated, but it is thought proper if after from six to ten weeks there is incontinence of urine or fæces with spreading bed-sores. One can hardly think that this will ever be a tempting or a very satisfactory field for surgical enterprise.

With regard to the treatment of spondylitic paralysis by surgical opening of the spinal canal, Kraske¹³_{Apr.} expresses a generally unfavorable opinion. Except in the rare cases in which such symptoms are due to deviations of the vertebræ, they are the result of encroachment upon the epidural space by tuberculous disease

of the bony substance, and this may either cause direct compression and anæmia of the cord, or render it œdematous by interference with the blood- and lymph- vessels. Unless such processes occur to a great extent, inducing scleroses and degenerations of the cord and nerve-fibres, they may exist for a long time, and yet the restoration of function be possible. It very rarely happens that the tuberculous deposits pass through the dura and affect the spinal marrow, and then not as a primary lesion, but toward the end of life. If such exudates, acting mechanically merely, could be removed, it would be entirely proper and advantageous to operate for this purpose. But since the procedure is no slight undertaking, the diagnosis ought to be very clearly made out, and extension should be fairly tried for a length of time without alleviation, or with a steady increase of the pressure symptoms, before operative interference is instituted; and, before deciding upon it, one must consider that, even with the greatest degree of success, if the compressing exudate is removed and the palsy relieved, the patient is far from being cured. Kraske thinks operation is called for in the cases, unfortunately rare, in which there is caries of the arches, and the canal is thus encroached upon. But where the usual combination of spondylitis with kyphosis is present, and where, in spite of milder measures, the paralysis advances and affects the bladder and bowel, there is probably a profound degeneration of the spinal cord, and not merely an interference with the circulation.

In a paper on "The Effects of Concussion of the Spinal Cord," Watson,⁶¹ opposes Erichsen's idea that slight blows may develop grave inflammatory consequences. He does not believe that rupture of the spinal membranes, or hæmorrhage between them and the cord or into the substance of the cord, can occur without fracture or luxation of the vertebræ. From his experiments, he judges that injuries to the vertebral articulations are not a whit more serious than those of the carpal or tarsal joints. He denies that inflammatory and other morbid changes take their origin in traumatism of the spinal cord with the frequency supposed by Erichsen and others, and thinks that immediate symptoms always occur, though they may be overlooked. As to mere concussion, he asserts that it cannot, with any certainty, be regarded as the starting-point of inflammatory phenomena. Harrison⁵⁹

reports a case of concussion of the lumbar spine, in a boy 13 years of age, from a blow. The immediate effect was a condition of collapse, with unconsciousness, coldness and pallor of surface, dilatation of pupils, loss of voluntary and reflex movements; a little later the pupils were contracted, and the eyes rotated downward to the left, with short horizontal movements of nystagmus. Reaction occurred, and with it several areas of cutaneous hyperæsthesia were developed, increasing in extent for some days, then gradually disappearing, until, on the eleventh day, he was discharged well, and so remained. With the exception of the primary collapse, he presented no general disturbance.

Rieder³⁴ reports the case of a tiler who fell from a second story. There was somnolence, paraplegia, and anæsthesia of the lower extremities; the fifth and sixth dorsal spines were prominent; vesications soon began to form. Sixteen hours after the accident the fractured spinous processes and laminæ were resected and removed, relieving the compression of the spinal cord, which was already somewhat softened. The symptoms, with the exception of the paralysis of the bladder, at once improved, and on the sixth day urine and fæces were discharged voluntarily. A plaster jacket was applied, and four months later the patient attempted to walk. Two months afterward he still had a slow and spastic gait, using a stick. A better result was obtained in a case reported by Weiss,¹⁸⁴ in which a man aged 34 had fallen a distance of four metres, and had a dorso-lumbar kyphosis, with paraplegia, paralysis of the rectum and bladder, and an enormous slough over the sacrum. A month after the accident, the arches of the tenth and eleventh dorsal vertebræ were removed; the cord was found angulated; the dura was not distended, and was left unopened. Immediate relief was experienced; all the symptoms subsided, and, two or three months later, the patient was able to walk perfectly well, and the spinal column presented no gibbosity.

A case is reported by Cochemé,⁵⁷⁷ in which a man aged 40, slightly hump-backed, fell about two metres, alighting upon his feet. He was at once paraplegic, with anæsthesia up to the base of the thorax and paralysis of the bladder. Symptoms of pulmonary congestion ensued, the man complained of numbness in his arms, and, on the morning of the tenth day, death took place suddenly. An autopsy showed the body of the first dorsal vertebra

to be completely crushed, and the cord so contused as to be practically destroyed at that point. There was also some blood effused within the membranes at the level of the lumbar enlargement. The fracture of the bone and the grave damage to the cord corresponded exactly to the seat of the previous angular deformity, which was accentuated by the slight fall sustained by the patient. Had surgical interference been instituted, it would obviously have been futile. A very interesting case of trephining of the spine for fracture-dislocation, with a good result, is reported by Knox.²¹³ The patient was a boy aged 13, injured in a pit by a "cage" falling upon him and doubling him up. The eleventh dorsal vertebra projected distinctly; both sensation and motion were lost in the lower limbs, but the bladder was under control. On the second day the spinal column was laid bare at the seat of injury, and the body of the eleventh vertebra was found broken across; the upper articular processes were also broken; there was displacement backward, with some rotary complication. The laminae of the tenth vertebra were sawn through, but the theca was not opened; careful extension was made, and the fragments pushed into proper place. Pulsation was at once restored in the cord, and the next day sensation was perfect in the lower limbs, but the power of movement, except of the toes, was not regained for nearly two months. At the time of the report, almost a year after the accident, the boy was able to stand erect, and even to take a few steps without any support; the movements of the ankle and tarsal joints were still very limited. Knox thinks, and it would seem with reason, that the injury sustained was chiefly in the anterior columns of the cord, about the middle or lower part of the lumbar enlargement. The recovery of movement, as well as of the size and firmness of the muscles, took place gradually from above downward.

A successful operation for fracture of the third lumbar vertebra, the cauda equina being compressed by callus, which was removed with difficulty after the stripping away of the laminae of the second, third, and fourth lumbar vertebrae, is recorded by Starr.¹⁵ The operation was performed a year after the occurrence of the injury; at the time of the report the man had fair control of the rectum and bladder, the paralysis had almost disappeared, and anæsthesia alone remained. Two cases of angular curvature, with paraplegia, treated by operation, are reported by Lane.²

One was that of a boy aged 16, who was hurt by a fall three years previously ; the deformity did not ensue for more than two years ; it affected the fifth dorsal spine. On removal of the spines and laminæ of the fourth, fifth, and sixth vertebræ, the cord was found spread out over a tense abscess-wall, which was opened, giving exit to caseous matter and large fragments of necrosed bone. The wound healed readily, and motion and sensation were regained, but motion was lost again ; a second operation was, therefore, performed, and a quantity of caseous material surrounding the cord was removed, without, however, affording any benefit. The other case was that of a girl aged 21, who, four years previously, had her back injured by a fall ; eighteen months afterward the spine of the tenth dorsal vertebra became displaced forward, and the right knee-joint swelled and became painful. Sensation and motion were lost in both lower limbs. On removal of the spinous processes and laminæ of the ninth, tenth, and eleventh vertebræ, the cord was found strongly compressed between the body of the tenth and the laminæ of the eleventh. Improvement ensued ; four weeks later the right knee-joint was excised. Paraplegia recurred, and the cord was exposed a second time ; it was stretched over a tense abscess, after the evacuation of which complete recovery took place.

Lane²_{Oct. 31} reports 11 cases in which laminectomy was resorted to by him for the relief of compression-paraplegia due to spinal caries. He urges that every such case should be operated upon with the least possible delay. In the discussion, Davies-Colley and Bennett opposed this view. Bowlby, however, cited 2 cases in which benefit had resulted, although no pus was found.

A case of pistol-shot wound, the bullet nearly severing the spinal cord, and lodging in the body of the eighth dorsal vertebra, is reported by Hawley.⁵⁰⁸_{Dec. '90} The patient, a man aged 39, lived nearly six years, completely paraplegic, with wasting of the lower extremities. His death is ascribed to extension of inflammation along the cord to the brain ; but the account given of the symptoms and of the post-mortem appearances does not clearly show the grounds of this statement.

Stab wounds of the spinal cord are discussed by Bode.¹² He cites a case in which a man received several stabs in the head, and one at the back of the neck, five centimetres long, running obliquely

down to the spinal column and exposing the atlas and axis. Paralysis of the right side was the chief symptom; the muscles of respiration were decidedly implicated. At the end of three weeks power began to return, and the reflexes became greatly exaggerated; but a year later the only trace of the injury was an occasional slight tremor in the muscles which had been paralyzed. Bode judged that there had been, in this case, a partial severance of the anterior column and of the anterior part of the lateral column. On anatomical grounds, he states that the cord can be wounded at almost any point in its circumference, or even wholly severed, without injury to the bone, when the neck is bent down forward, as it is apt to be in a fight. He cites several cases of perfect healing of wounds of the spinal cord, involving not quite half its diameter. The symptoms usually ascribed to traumatic myelitis he regards as due to traumatic degeneration. The exaggeration of the reflexes is explained by a secondary degeneration, cutting off the influence of the reflex inhibitory fibres running down the lateral columns. A third form of degeneration, called "cavity formation," is also referred to. The symptoms would seem to vary greatly in different cases, the immediate onset of sharply-defined paralysis being the most conclusive. Bode advises enlarging the external wound and keeping it open, with free drainage and careful asepsis. The wound should be allowed to granulate, or be closed secondarily.

Verneuil³ reports a curious instance of a fistulous track in the sacral region, connecting with the spinal canal, in a young girl. Sixteen months previously she had suddenly felt pain over the sacrum; a tumor was observed, which grew to the size of a half-orange in four months, and then burst, giving exit to a large quantity of pus; from this time a fistulous orifice remained, about five centimetres to the right of the median line. By means of a thermo-cautery the track was laid open and explored with the finger as far as the third sacral foramen, which seemed abnormally large. On the fourth day, a large sero-purulent exudation continuing, profound coma ensued. Its duration is not stated, but it had been noted on several previous occasions. The liquid presented, on analysis, the characters of cerebro-spinal fluid. The patient recovered, but with a small fistulous orifice still persisting.

A case of spina bifida occulta in the sacral region, in a man

of 22, giving rise to wasting paralysis and talipes equino-varus, with hyperæsthesia of the body and anterior part of the thighs, and anæsthesia of the buttocks, posterior part of thighs, legs, and feet, is reported by Jones.² The distortion appeared first in the left foot, and ten months later in the right, an operation being performed on the former. The spinal trouble was now detected, and treated by medication for seven months without effect. As there was an obvious defect at the second sacral vertebra, the canal was opened here, and a dense adventitious band was found compressing the cauda equina. This was divided, and great relief given. About three months later the right foot was rectified by operation, and at the time of the report the patient's condition was very good.

A case of spina bifida, in a lady 24 years of age, successfully removed by operation, is recorded by Clutton.⁶ The tumor was situated at the junction of the last lumbar vertebra with the sacrum; it was twenty-three inches in circumference, an increase of three inches in as many years. The removal was decided upon in view of her prospective marriage. The only notable incident was a copious discharge of cerebro-spinal fluid, coming on on the eleventh day and lasting a week. In a case of spina bifida reported by Holt and Van Giesen,²⁴² death occurred from suppurative inflammation of the wall of the sac, extending to the membranes of the cord and brain.

Ceci,⁵⁸⁹ reports 2 cases of sacrolumbar hydromeningocele successfully treated by excision after subcutaneous ligation with catgut. Stewart,² reports a case of spina bifida in the lower lumbar region successfully treated by exposure by incision, and the application of a chromicised catgut ligature to the narrow neck or pedicle. The infant is said to have had, also, a hypospadias of moderate extent at "the proximal end" of the penis.

Stewart,² reports a case in which a spina bifida in the lower lumbar region was co-existent with hypospadias, in a newborn child. The sac was exposed and cut away, after a ligature of chromicised gut had been tied around its pedicle. Union took place by first intention.

Doughty,¹¹⁷ reports a case of internal or pelvic spina bifida. He thinks it is only the fourth upon record,—1 having been observed by Emmet in 1870, and 2 by Thomas in 1885. A fatal

result followed operation in both of Thomas's cases, and the warning of that surgeon against such interference under a mistaken diagnosis is quoted.

Resection of a cyst in the lumbosacral region, not communicating with the spinal canal, in a girl 15 days old, was performed by Picqué.¹¹²_{Nov.} The cure, locally, was complete; but the child became, later, the subject of hydrocephalus and paraplegia.

Roy¹¹⁷_{Dec., '90} gives an account of a case in which, in a man aged 42, the spines and transverse processes (laminæ ?) of the four lower dorsal vertebræ were removed, the dura mater slit up for two inches, and a tumor dissected off from the exposed cord, with relief to girdle-pains, paraplegia, twitchings, and other symptoms which had led to a correct diagnosis. Unfortunately, the history given is very vague, and there is no statement of the nature of the morbid growth. A case in which an extra-dural lymphangioma cavernosum of the sacral region, causing severe pressure on the cauda equina, was successfully removed by operation is recorded by Rehn.⁶⁹_{Apr. '90}

Bazy³_{Apr. 1} claims to have opened the spinal canal in November, 1886, six months before Horsley's first operation, in the case of a woman aged 45, for the removal of a hydatid cyst, causing motor and sensory troubles in the lower limbs. The patient died, three weeks later, of suppurative nephritis, brought on by catheterization, repeated several times daily. Bazy urges the propriety of the exploration of the canal in certain cases of doubt; he thinks no special osteotomes necessary. He advises that, when the dura has been opened, it should be accurately closed without drainage, to prevent the escape of cerebro-spinal fluid.

SURGERY OF THE NERVES.

An interesting instance of resection of the second branch of the right trigeminus nerve at the base of the skull is recorded by Krause.⁹⁴_{Mar. 10} The patient, a woman 45 years of age, had, three years previously, had the infra-orbital nerve very thoroughly resected by von Volkmann, on account of intense neuralgia. The pains recurring a year afterward, the periosteum was torn off from the lower wall of the orbit, but again with only temporary relief. It was, therefore, determined that the nerve should be divided as

far back as possible. A curved incision was made over the zygoma from the ear to the cheek, the convexity above, and a vertical cut at either end of it. The duct of Steno was untouched. Only the skin was divided below, but over the bone and along its upper edge the periosteum and the temporal fascia were cut through. The zygoma was sawed apart at two points, and the flap containing it, with skin, fascia, and masseter muscle, was turned down so as to expose the temporal muscle attached to the coronoid process of the lower jaw. The base of the coronoid process was now divided with a chisel and turned upward, along with the muscle; the internal maxillary artery was ligatured at two points and divided between, and the external pterygoid muscle separated at its origin from the under surface of the greater wing of the sphenoid. At the bottom of the deep, funnel-shaped wound the nerve was found—crossing from the foramen rotundum to the inferior orbital fissure—in the speno-maxillary fossa. It was caught with a small, sharp hook, and the intra-orbital portion, or stump, drawn out; then the nerve was pulled as far as possible out from the foramen rotundum, and cut off close, about one and one-half centimetres being removed. It was very markedly reddened. The operation was very easy. The wound was dressed as usual, and healed readily. All pain ceased twenty-four hours afterward, and the patient has remained well.

Rose is reported,⁶ to have removed the Gasserian ganglion by a very similar procedure, except that, on reaching the foramen ovale, a trephine was applied around it, and a disk of bone removed; the ganglion was then seized with hooks—one with a cutting edge on its concave side—and its connections divided. The patient, a woman aged 60, had no return of the neuralgia, from which she had suffered for many years. A somewhat similar method is described by Duret.²²⁰ He makes an incision along the edge of the orbit, the upper edge of the malar bone, and the zygoma; divides the malar bone, far forward, with a chain-saw, and breaks the zygoma; exposes the temporal muscle, and draws it backward, when the nerve can be caught with a blunt hook, drawn down, and divided. Duret speaks of the difficulty sometimes experienced in identifying the nerve, and suggests the making of another incision in the infra-orbital region, where the nerve can be caught and pulled forward, when the portion caught by

the blunt hook should be rendered tense; if it is not so stretched, it may be the internal maxillary artery, or a fibrous band from the external pterygoid muscle.

Stewart^{1 Oct. 24} advocates nerve-stretching in preference to neurectomy in inveterate cases of trigeminal neuralgia, mainly on account of the risks attending the latter procedure. He states that stretching the nerves, or as many branches as are affected, has been found by him to give either great or complete relief in the majority of cases, and that the operation can be repeated if the pain should return. He had reference especially to the form of neuralgia attended with facial spasm, and the onset of which is very sudden. Mischi^{96 Nov.} thinks nerve-stretching a special therapeutic process, influencing the nerve-centres; it is efficacious in peripheric lesions, —neuralgias, traumatic contractures, and reflex epilepsy; useless in tabes dorsalis and affections of the medulla oblongata; it promises very little in the treatment of tetanus. Two cases are reported by Mixter,^{99 Jan. 28} in which the third division of the fifth nerve was excised at the foramen ovale for the relief of long-standing neuralgia; the results obtained are not stated.

Andrews^{61 Aug. 1} has published some interesting studies made on the cadaver, with reference to the best mode of getting at the semilunar or Gasserian ganglion, for the purpose of removing it, in cases of obstinate trifacial neuralgia. So far, he has determined the possibility of six methods:—

1. By the preliminary removal of the upper maxilla, a small trephine being then applied over the foramen ovale, to make an opening through which the ganglion can be extracted.

2. By an **H**-incision: the transverse portion over the zygoma, which is sawn through at either end and turned down with the masseter; the coronoid process of the lower maxilla is then divided and turned upward with the temporal muscle; the foramen may now be found by following up either the inferior dental nerve or the edge of the external pterygoid plate; a trephine with a long, slender centre-pin and a long shaft is more convenient than the ordinary one.

3. A like procedure to the last-described, except that the external pterygoid muscle is divided and its head cleared away from the sphenoid bone, when there will be exposed a smooth triangular space, having its base at the pterygoid ridge of the

temporal bone and the foramen ovale near its apex; the trephine is applied to this space, at the outer side of the foramen, and the intervening bridge of bone nipped away, when the ganglion will be within reach.

4. Proceed as just directed, but use a large trephine, applied farther outward, raise the dura, and work inward with the finger, until a probe passed through the foramen is felt.

5. Expose the temporal fossa, and apply a large trephine close down to the zygoma; divide the dura, and, with an arched spatula, raise the brain so as to pass the finger along under it and feel the ganglion.

6. Expose the anterior end of the zygoma, and saw through it; divide the posterior end through a small opening in the skin; saw off the ramus of the jaw from the middle of the coronoid process down toward the angle; exsect the condyle, draw away the external pterygoid muscle, and divide part of the internal, when the before-mentioned triangular space will be uncovered.

The foregoing statements are as concise as possible, but will probably convey to surgeons already familiar with the anatomy of the region an idea of the main features of each procedure. The first and sixth methods involve too much needless sacrifice of parts to be employed on the living subject; the second is, perhaps, the least complex, and the safest, except in very experienced hands, when the third or fourth would be more available, as affording an opportunity for insuring the complete removal of the ganglion; the fifth involves more risk of damage to the brain than either of the others.

This article contains some very practical details as to the relation of the ganglion to the dura, as also to the internal carotid and middle meningeal arteries, but space is wanting for their repetition here.

Two cases of dislocation forward of the ulnar nerve are reported by Stabb.⁶ One, in a woman aged 28, seemed to have been caused by suppurative cellulitis, following a slight injury. Croft exposed the nerve by an incision, and sutured its sheath to the periosteum and edge of the triceps tendon. The wound healed well, the nerve remaining secured.

The other case was that of a man aged 30, who knew of no injury to his elbow, but had had a great deal of writing to do.

Sir W. MacCormac laid the nerve bare, and attached it, by means of two loops of kangaroo-tendon, to the inner edge of the triceps tendon; the divided fascia was also sutured with catgut. Decided improvement ensued.

In a case of recurrent dislocation of the ulnar nerve Pearce Gould²²_{Oct. 28} reduced it, and fixed it in its place by means of three kangaroo-tendon ligatures cast around it, including some of the tissue of the triceps tendon; the sheath of the nerve was also attached to the aponeurosis of the tendon by means of fine sutures.

A very interesting case is reported by Gardner,⁶_{Oct. 10} in which an inch and a half of the ulnar nerve was destroyed by a gunshot wound, and the remaining ends could not be brought together; each was therefore dissected up for about six inches, and the ends carried round to the front of the elbow, where they were readily united by three catgut sutures. The result was entirely satisfactory.

Beach⁹⁹_{Dec. 11, '90} suggests a new method of operating for the restoration of nerve-trunks when a considerable portion has been lost. It consists in opening the nerve-sheath for a sufficient distance along the trunk, beginning from one of the ends; cutting the trunk half across, and then splitting it down nearly to the end, thus forming a long flap, which can be turned over and carried across the breach, and joined either to the other end or to a flap similarly formed from it.

This procedure, which Beach proposes to call "neuroplasty," he has not yet tested; but it is certainly ingenious, and may be found to possess great practical value.

This method seems to have been put in practice by Dittel⁸_{Apr. 18} in the case of a washer-woman, whose ulnar nerve was completely divided in a large wound on the inner side of the arm, above the elbow, the limb having been caught in a drying-machine. A strip seven centimetres long was split from the peripheral end, turned up, and united with a similar strip, one and one-half centimetres long, from the proximal end. The final result of the procedure, which Dittel calls "autoplasty," or flap-transplantation, was the restoration of sensitiveness and movement; but it was obtained only after a steady course of electrical treatment, long continued. The plan would also appear to have been employed in the first of

the 2 following cases reported by Vucetic.⁵⁷⁸ In one, the ulnar nerve was crushed by machinery, the other soft parts being also severely lacerated, just below the elbow; four centimetres of it were destroyed and were cut away, after which a flap was cut from each end, and the two united with a catgut suture, no fine silk being at hand. Much constitutional reaction, with suppuration of the wound, ensued, and prolonged use of electricity to the ulnar nerve was necessary, but a good result was ultimately obtained. In the second case, the tendons and the median nerve at the wrist were divided by the edge of a scythe; immediate suture with catgut was performed, and, after the wound was healed, three weeks of massage and faradization restored the function of the nerve.

Sir Joseph Lister is reported²² to have sutured the median nerve, divided near the wrist four months previously, in a boy 6 or 7 years old; three sutures were used, and the hand was kept flexed, at a right angle with the forearm, by means of a starched bandage. A case of successful secondary suture of the musculo-spiral nerve, divided by a knife wound, is recorded by Neely.⁷⁴ The material used was fine silk-worm gut. Pearce Gould,²² has reported a case in which a man sustained a wound of the median nerve at the wrist, by a piece of glass; healing took place readily, with some loss of sensation in the fingers; later, a bulbous enlargement at the seat of injury was excised, but a second operation was required to free the nerve from adhesions, the ends being again sutured, and the wound dressed in flexion. A number of interesting and instructive cases of injury of peripheral nerves, reported by Hulke,⁶ illustrate the importance of early resection and suture; some of them show the influence of the character of the damage to the surrounding tissues, as well as to the nerves themselves, in regard to prognosis.

With regard to compression of nerves by callus, Trélat¹¹² says that motor and sensory changes are more common than those of nutrition. Operation affords the only chance of cure. The nerve may be lifted up and stretched, or inclosed in a fibro-osseous canal. As degeneration is progressive, surgical interference should not be delayed; restoration of function occurs sooner in the young than in the old, and may not be apparent for some time (in 1 case three months) after operation.

A case of sciatica, in which no treatment had given relief, but which yielded promptly to the stretching of the nerve, is reported by Blomfield.²⁶_{Oct. 1} The author recommends the method adopted by Prof. J. Bell, of exposing the nerve at the middle of the thigh posteriorly, rather than between the trochanter and the tuber ischii; he quotes the opinion of Althaus that undue violence should be avoided, and that the operation should not be resorted to when there is reason to suspect disease of the medulla oblongata, —as, for example, when the patient suffers from asthma, or from certain cardiac and respiratory disorders.

Kummer¹⁸⁷_{Dec. 30, '90} relates the case of a woman, unmarried, aged 48, who was the subject of hard, painful tumors, connected with the branches of the occipital nerves, and readily excised, with the effect of relieving severe neuralgia, from which she had suffered for eight years. Microscopically, these growths seemed to be fibromata, the irritation caused by them having caused some hyperplasia of nerve-fibres.

Three cases of sarcoma affecting nerve-trunks are placed on record by Hume.⁶_{Sept. 19} In 2 the sciatic nerve was the seat of the disease, and in 1 the internal popliteal; in all, the new growths were so incorporated with the nerve-fibres that they could not be dissected away, and excision of the trunks was necessary. In 1, about six inches of the sciatic had to be excised; in spite of which the condition of the limb remained surprisingly good, the only morbid phenomena being wasting and coolness of the limb, a smooth and blue appearance of the skin of the foot, and loss of sensation, except in the area supplied by the lesser sciatic and long saphenous nerves. Walking was accomplished by means of the quadriceps extensor muscle chiefly. In another, although the portion of nerve involved was less, the divided ends could only be brought together by strong extension of the hip and flexion of the knee; healing took place readily, and the united nerve, at first very tense, seemed to yield, until the patient could walk with hardly any limp; sensation was almost lost in the foot. He died, about eight months later, from a sarcoma of the chest-wall. The third case, involving the popliteal, had been operated on five years previously, three inches of the nerve having been removed and the divided ends left to themselves; there had been a gradual recovery of muscular power and of sensation, which were at first lost,

except in the gastrocnemius, the nerves of which came off above the point of operation. How such restoration of an exsected portion of nerve is effected is not yet known.

THORACIC SURGERY.

By J. McFADDEN GASTON, M.D.,

ATLANTA.

I CANNOT present a more suitable introduction to the progress made in thoracic surgery than to record the very important results of pulmonary phlebotomy.

George Harley ^{Nov. 29} comments upon an instructive and interesting paper by Christian Simpson, entitled, "A New Method of Bleeding in Some Forms of Pulmonary Congestion," in which he relates 4 cases in which he had practiced it with benefit to the patients. This is an extension of Harley's method of performing hepatic phlebotomy, which was laid before the profession in 1886. He has, however, an improvement upon that process, which is indorsed by Harley, as follows: After the withdrawal of 12 ounces (360 grammes) of blood, the cannula was held *in situ* with the finger over the end to allow of a clot forming, and then it was slowly withdrawn altogether. The patient was immediately and markedly relieved. Harley proposes a modification in the mode of procedure, which will make the plugging of the wound by the coagulum still more secure and effective, while it obviates its detachment. His proposal is, that the trocar being thrust some distance into the tissues of the organ from which it is desired to extract blood, before placing the point of the finger on the mouth of the cannula with the view of arresting the blood-flow, it should be slightly withdrawn,—say, about half an inch or more,—in order to leave an empty passage wherein a sufficiently large blood-clot may form and fill the channel. In this case, the surrounding tissues of the organ will, in contracting upon the clot, hold it so firmly by their own resilience that, on the withdrawal of the cannula, it will break off from the end of the much larger mass within it, and remain as an effective plug in the wound.

(B-1)

STAB-WOUNDS OF THORAX.

A most remarkable incised wound of the chest is reported by A. V. L. Brokaw.⁶⁵ The history of the case is as follows: Thomas Barry, aged 26, shipping clerk, while engaged in a general fight, received two stab-wounds: one on the right side, extending

STAB-WOUND OF THORAX.
(*St. Louis Courier of Medicine.*)

from the third rib at the costo-cartilaginous junction and severing completely the cartilages of the fourth, fifth, sixth, seventh, eighth, and ninth ribs, wounding the lung and completely severing all the muscular and cartilaginous structures. The thoracic wound extended from the third rib to within an inch of the navel. The abdominal wound began a little to the right of the navel, and ex-

tended to within two inches of Poupart's ligament on the left side. The length of the thoracic wound was a fraction less than thirteen and a half inches, the abdominal wound a fraction over six and a half inches, with almost complete intestinal evisceration. The patient was in a condition of profound collapse.

The attendant closed the abdomen, and an ambulance in waiting hurried the patient to St. John's Hospital, where he arrived an hour and a half after the cutting. The thorax and abdomen were thoroughly cleansed and shaved. The abdominal sutures were at once removed. A wound of the mesentery, in an angular form, revealed three or four bleeding vessels, which were secured both distally and proximally. The flap of mesentery was stitched in place with fine catgut. All particles of dirt and foreign matter which adhered to the intestines were removed by douches of hot water, with the assistance of a sponge and fingers. The abdominal wall was closed by interrupted sutures, leaving a large-sized glass drainage-tube extending out from the pelvis.

Upon directing attention to the thoracic wound, it was found that all the cartilages, from the fourth to the ninth, inclusive, had been entirely cut, and a peculiar movement and friction between their ends was noted. On examination, the lung was found partially collapsed, and a small wound near the anterior margin was present. Heavy pedicle-silk was used to suture the cartilages together, a single suture for each of the divided ends, and this procedure effectually arrested the sawing movement upon respiration. The lung was not completely collapsed, owing to the existence of old adhesions laterally, and in part, perhaps, to the modification of the atmospheric pressure from the very large opening in the thoracic walls. All hæmorrhage was checked by ligature and gauze-packing in the interchondral spaces. In placing the sutures, as much of the underlying muscular structure as possible was included. Hot bottles were placed about the patient, the foot of the bed elevated, and nitro-glycerin and whisky were given hypodermatically. In a few hours the patient rallied thoroughly, but with great thirst from the loss of blood. The temperature at 7 A.M., July 6th, was $100\frac{2}{5}^{\circ}$ F. (37.9° C.) and pulse 124, but both gradually declined afterward, until, at 8.15 P.M., July 15th, the temperature was $98\frac{4}{5}^{\circ}$ F. (37.1° C.) and pulse 78. The patient was discharged, August 12th, with only a slight ventral hernia.

In commenting upon the foregoing case, A. D. Barr⁶⁵ states that the reason complete collapse of the lung did not occur can only be satisfactorily explained by taking into account the physical laws governing gases.

There are two reasons why the lungs do not completely collapse when the thorax is opened: 1. The atmosphere presses equally in all directions, and, as the atmosphere and the attraction of gravity are the only forces to cause collapse, it is necessary to examine the condition governing the admission of air into the lungs. 2. Another physical reason why the lungs do not completely collapse when the thoracic cavity is opened is to be answered by the law of gaseous diffusion.

A report of stab-wound into the lung, by J. E. Sadlier,¹ affords a striking illustration of recuperative power in these cases. William R., aged 27, native of the United States, married, and painter by occupation, upon the evening of November 1, 1890, thrust a blade about five inches long, with one straight edge and the other curved, up to the hilt into his own left breast. His garments, about the wound, were saturated with blood. His pulse was rapid and weak, respiration shallow and diaphragmatic. He coughed up mouthfuls of bright, frothy, arterial blood. A wound an inch in length was found between the fourth and fifth ribs, an inch anterior to and extending up to the lower border of the nipple. Upon inhalation, air mixed with blood bubbled through the opening. He was given a drachm (3.89 grammes) of normal liquid ergot, and a hypodermatic injection of morphia, $\frac{1}{4}$ grain (0.016 gramme); atropia, $\frac{1}{160}$ grain (0.00043 gramme); with bottles of hot water placed at his sides and feet. A drainage of catgut was fastened by adhesive plaster between the external lips of the wound, and it was closed with catgut suture. Iodoform was dusted over the surface and covered with iodoform gauze. Pads of cotton, encased in sublimate gauze and secured by a bandage four and a half inches wide, applied as tightly as possible, to restrict any motion of the side. It was doubtful whether the pericardium was injured, but the lung-tissue was cut. November 2d, 10 A.M., the temperature was 100° F. (37.8° C.); pulse, 80; respiration, 24. November 3d, 9 A.M.: temperature, 102° F. (38.9° C.); pulse, 108; respiration 34, and shallow. Physical signs of traumatic pneumonia and pleurisy, with acute pericarditis. The patient had

an anxious expression, and his bowels were distended and tympanitic. He was given a turpentine-and-oil enema, with the desired result. November 4th: temperature, 101.5° F. (38.6° C.); pulse, 96; respiration, 34. Indications of effusion into the pericardium. Took a minim (0.06 gramme) of fluid extract digitalis, alternated with 2 grains (0.13 gramme) of carbonate of ammonium in a drachm (3.75 grammes) of liquor ammonii acetatis hourly. Five weeks from the date of injury he was entirely restored, and resumed his usual business.

GUNSHOT-WOUNDS OF THE CHEST.

Manley¹⁹_{Aug. 29} reports a case in which the ball penetrated the right pleural cavity an inch and a half to the right of and about one inch below the nipple of the right breast, taking a downward and backward direction. On the third day pleurisy was developed, followed by effusion and septic infection. An incision was made into the ninth intercostal space, and, after the pleura was divided, the greater portion of the shaft of the ninth rib, for a distance of half an inch, was excised with a sharp rongeur. This gave vent to a very large discharge of a sero-sanguinolent fluid, mixed with flocculi of lymph, tinged a deep-yellow bile color, indicating that the bullet had taken a direction through the diaphragm into the liver. Two drainage-tubes were introduced and antiseptic dressing applied. The patient rallied well from the ether, and expressed great relief when consciousness returned.

A patient was presented to the Harlem Medical Association by Truax,¹⁵⁷_{Jan.} who, two years ago, was shot through the chest. Some months after recovery he had pleurisy, with effusion, and was aspirated, with relief. Later on he had empyema, and an incision was made beneath the lower angle of the scapula. An abscess developed subsequently, and an inch and a half of rib resected, with a drainage-tube inserted, and the case terminated favorably. A fatal result is given by M. Schmit,³_{Oct. 28} before the Chirurgical Society, from the ball of a revolver, which penetrated the thorax. It entered at the fourth intercostal space, and perforated the pulmonary artery on the left side before it entered the lung. The left pleural cavity contained about 2 litres (4 pints) of coagulated blood.

M. G. Céry⁵⁷⁷_{Feb.} reports the favorable result of a gunshot-wound

of the lung, diaphragm, peritoneum, and kidney, inflicted, January 27, 1890, in the person of François L., aged 45 years. In mounting a ladder he received two balls,—one in the left thigh, which was extracted, and another in the chest, three centimetres below the left nipple, between the fifth and sixth ribs. There was a sanguineous tumor in the sacro-lumbar region, purplish at its summit, of the size of a pigeon's egg. Palpation indicated the presence of a foreign body beneath. Dyspnœa, with shallow respiration, pain in the subclavicular region, and some signs of pneumothorax were present. Also acute lumbar pains, with inability to lie on the left side. There was abundant bloody urine. An injection of morphine was given. Harman cut down upon the ball and extracted it on January 28th. There was notable improvement on January 31st, but pleurisy supervened on both sides, with congestion of the lungs, and only ceased after two months, when he recovered. Herman Mynter⁹⁶ gives an interesting account of Witzel's method of relieving pneumothorax from penetrating wounds of the thorax. Pneumothorax is a dangerous complication of penetrating wounds of the chest, partly interfering with respiration, partly with the circulation, by pressure on the heart and large vessels. Witzel's process is to change the pneumothorax into an artificial hydrothorax, and then to empty this by siphon drainage. Having arrested the bleeding, a male catheter of metal is introduced into the pleural cavity through the highest point of the wound, its beak being parallel with the chest-wall. The wound is then closed by sutures, both air- and water- tight, with the exception of a small opening at the highest point. The pleural cavity is now generally filled up with a solution of boracic acid, of the temperature of the blood, until all the air is expelled, as is supposed, by the contributor, through the small orifice left above the site of the catheter, though it is stated in the description to be through the catheter. All the fluid is then removed from the pleural cavity by depressing the irrigator, which acts as a siphon. Again, it occurs to the contributor that the orifice above must be closed during this process, while it is not so stated in the account of this procedure. And, further, it is suggested that the dependent orifice of the catheter should be closed in withdrawing it, and the opening hermetically sealed. The case, treated in this way, in Trendelenburg's clinic, progressed very favorably.

CLOSURE OF PENETRATING WOUNDS OF THORAX.

In a paper upon traumatism of the chest, Gaston⁶¹ insists upon the hermetical sealing of penetrating wounds of the thorax. Independent of the recognized advantages of closure in the lesser accumulations of blood in the pleural cavity, it is held by some, with a show of practical discernment, that, in the most extreme cases of thoracic hæmorrhages, the flow of blood externally should be arrested by plugging the orifice, so as to favor the coagulation of the blood within, and by compression upon the lung to prevent further extravasation. Thus, it is held that occlusion may be applicable to every variety of penetrating wounds of the chest; but there must be certain preliminaries observed in the preparation of the patient for receiving the benefits of this procedure. Placing the patient so that the opening shall be the most dependent part, with a firm bandage around the thorax, and making the occlusions immediately after the expulsion of air and blood from the wound by forcible inspiration, should promote a favorable result, so as to close the orifice with the least blood in the cavity of the pleura that is possible. He also cautions surgeons against cutting out balls lodged between the ribs after traversing the cavity of the chest, thus making a counter-opening into the thorax, and advises that they should be allowed to remain until the track has become obliterated.

FOREIGN BODIES IN THE THORACIC WALL.

The history of a piece of lead-pencil driven into the chest-wall is narrated by Acheson.⁹ Nothing could be seen on the surface but a small opening like a bullet-wound in the axillary line, between the eighth and ninth ribs, of a boy, who had fallen upon a pencil on November 8, 1890. Acheson was sent for on November 25th, and told that the pencil was coming out. He found the point protruding in the back, just to the left of the mid-dorsal spines. The pencil, which was lying in a suppurating sinus, was removed, the sinus was washed out, and it healed nicely. Spencer relates the case of a man who ran a lead-pencil into the axilla. The wound healed, but subsequently a swelling appeared under the clavicle, and in this swelling a distinct and loud bruit could be heard; this bruit was transmitted, and could be heard in distant parts of the body. The condition was one of aneurismal varix, produced by a simultaneous wound of the axillary vein and

axillary artery and a subsequent intercommunication between them.

EXTENSIVE LACERATED WOUND OF THORAX.

A very extraordinary lesion of the sternum and cartilages of the ribs on the left side of a boy 15 years old exposed the peri-

LACERATION OF THORACIC WALL. (DIVINE, BAK, AND GASTON.)

cardium and lungs, and recovered, under care of Divine and Bak, with the author's co-operation.

I am indebted to K. C. Divine for the following notes: S. J. P., 15 years old, fell into an operating elevator on July 15, 1891, and was injured by the machinery. There were 6 lacerated wounds, running longitudinally along the left and anterior

portion of the chest, 5 being through the skin and flesh, about six inches long, and 1 through the chest-wall about eight inches. The third, fourth, fifth, and sixth ribs were fractured and torn apart, while about an inch of the fourth was lost. Several jagged fragments were removed. A portion of pleura, two by four inches, had been torn away, exposing the pericardium and left lung, the former being penetrated and the latter torn. The lung finally collapsed completely, and no air seemed to enter it for three or four weeks, but gradually returned.

The lacerated integument could only be closed approximately by suture, and the central opening was filled with iodoform-gauze, while the whole surface was dusted with iodoform and covered with a thick fold of gauze and cotton, secured by a bandage drawn firmly around the chest to control the respiration.

The small complaint made by the patient and the slight shock experienced, although there was extreme pallor, were very notable in this case. Subsequently the chest-cavity was filled with a dirty serum, which was evacuated by turning the patient onto his left side. Irrigation with a warm solution of boracic acid was used every day, and when the discharge became purulent the peroxide of hydrogen was employed. Two points of necrosed ribs were excised, after which the wound healed, the lung was restored, and without lateral curvature.

FISSURE OF STERNUM.

An instance of this is reported by Faidherbe²²⁰_{Sept. 25} in an individual 40 years of age. He struck against something at night, and the lower and anterior part of the sternum presented a soft and fluctuating tumefaction. There was great pain in the line from the ensiform cartilage to the body of the sternum on the left side, and extending obliquely to the right for five or six fingers' breadth from this point.

Auscultation revealed nothing on the part of the lung, the pleura, or the heart. After some days the tumefaction subsided, but the pain continued for a considerable time in the same line, and the inspiration produced a notable increase of this pain. The exact localization of the painful symptoms in a linear tract led to the belief that there was a fissure of the sternum from direct traumatism, an occurrence relatively quite rare.

REMOVAL OF CHONDRO-SARCOMA OF THORAX.

Mikulicz³⁴ reports the case of a man 54 years old, in which he resected the thoracic wall with the skin, making a right longitudinal incision from the nipple to the angle of the ribs, then resecting the ninth, tenth, and eleventh ribs. The lungs were exposed and covered with sterilized cloths, but no antiseptic was used in removing the tumor. The wound was closed with continuous silk suture and healed promptly.

OSTEOCHONDROMA OF THORACIC WALLS.

Zaburin, of Kharkov, ²_{Sup. Aug. 1} relates the case of a young Cossack with a steadily growing tumor of seven years' standing. It measured twenty-one centimetres horizontally and nineteen vertically, and occupied the right side of the chest between the nipple line and the post-axillary line from the sixth to the ninth rib. The new growth was hard, nodulated, immovable, and more adherent to the skin. An osteochondroma was diagnosed. The huge mass was removed, together with the involved portions of the seventh, eighth, and ninth ribs. The gap left in the chest measured seventeen centimetres in a horizontal and sixteen in a vertical direction. On opening the thoracic cavity, the lung collapsed only partially, owing to pleural adhesions around the borders of the new growth. A long drainage-tube was inserted and the crucial-shaped wound was closed with silk sutures. For the first two days the patient was much collapsed and cyanosed, suffering from an agonizing cough and obstinate vomiting; but his general condition slowly improved afterward. Pus escaped from the tube for eight weeks. On the sixty-first day the tube was removed, and the wound healed up. On the hundredth day the man was discharged, with an appropriate pad over the deep depression. Similar cases have been reported by Billroth, Fisher, Leisrink, Richerand, Sédillot, Vasilieff, Volkmann, Waltmann, and Witzel, with 6 recoveries and 4 deaths.

EXOSTOSIS AND ABSORPTION OF BONE.

A rare case, due to *la grippe*, is presented by Brothers.¹_{July 18} L. H., a boy of 16 years, was seized with chill and pain in the chest on December 20, 1889. On the following day he was in a state of great prostration. His temperature was 105° F. (40.6° C.), res-

piration rapid, and pulse almost imperceptible. For a number of days he was delirious, cyanotic, and in a state of collapse, with involuntary discharge of fæces and urine. Pus was discovered by the use of the aspirator-needle in the right chest-cavity on the eighth day of the illness. On January 3, 1890, an incision was made in the seventh intercostal space, behind the axillary line. A large quantity of pus escaped, and two large drainage-tubes were introduced in the pleural cavity. One of the tubes was removed within a week, but the other was retained for eight weeks. The boy gained in flesh and strength, but a fistulous tract remained, and the probe entered a depth of three inches in an upward and forward direction.

EXOSTOSES OF RIBS. (POSTERIOR VIEW.)

A, upper rib (seventh); B, cavity due to absorption; C, new growth of bone; D, lower rib (eighth.)
(*New York Medical Journal.*)

On November 21, 1890, portions of the seventh and eighth ribs were exsected, having a central bridge of new bone between them, which was broken through at the time of the operation. The upper rib shows, on its lower border, a circular aperture a quarter of an inch in diameter, due to absorption from the drainage-tube. This bridge of bone is half an inch square, and extends farther backward than the ribs themselves.

THE "FUNNEL-SHAPED BREAST OF EBSTEIN."

A case of this deformity is reported by O. L. Schmidt,¹¹⁵ along with remarks upon other cases. This is a very marked deformity of the anterior thoracic wall, consisting of a depression of the median region of the chest and the adjacent abdominal wall, the bottom of the depression being formed by the lower end of the sternum, and apparently resting almost on the vertebral column, described by Ebstein under the title of "Trichter-brust,"—funnel-

shaped or funnel-formed breast. He collected 5 cases, which have been reported in the German and French literature as rare deformities of the thorax. Two cases of his own, and 3 or 4 more cases observed by others, with the 1 reported by Schmidt to the Chicago Medical Society, on November 3, 1890, added to the above, make 12 cases on record at that date.

The funnel-shaped breast is more frequently found in the male than in the female. In the majority of cases it was present at birth, or was discovered in the first few years of life, but, unfortunately, never came to medical observation until fully developed. The main characteristics were a diminution in the antero-posterior diameters of the thorax, so that the proportions between these and the transverse diameters were much increased; then, a shortening of the length of the sternum and complete absence of any etiological factors.

FOREIGN BODIES IN THE BRONCHI.

W. B. Coley¹_{May 20} relates the case of a child, 2 years old, who swallowed a black-headed pin, and physical examination showed vesicular breathing much diminished on the right side and crepitant râles over right lung. Chloroform was given, and tracheotomy below the isthmus of the thyroid enabled the operator to seize the point of the pin with forceps, and remove it from the right bronchus. It was two and one-fourth inches in length, and the head was the size of a pea. Rapid recovery followed this operation.

A case is recorded by W. D. Cheadle and Thomas Smith, of London,⁶_{Jan. 4, '88} in which a metal cap from the end of a pencil was extracted from the extreme end of the left bronchus. The patient recovered completely. Several instances of foreign bodies in the lungs are noted by F. L. Haynes.⁹⁸_{May} A middle-aged man had symptoms of pus in the apex of the right lung, and expelled a tooth from the lung during a paroxysm of coughing, after which recovery was rapid and complete. A woman, aged 50, swallowed a bone, and a cavity in the lower lobe of the right lung was developed. After six months she coughed up a large piece of the body of a sheep's vertebra. The suppuration continued, and the woman died within a year. A boy, 5 years old, had a bean to go "down the wrong way," and suffocative symptoms continued until death ensued, thirty-six hours afterward, owing to occlusion of air-passage. Schoyler, of Berlin,¹⁹_{Nov. 20} extracted from the trachea of a

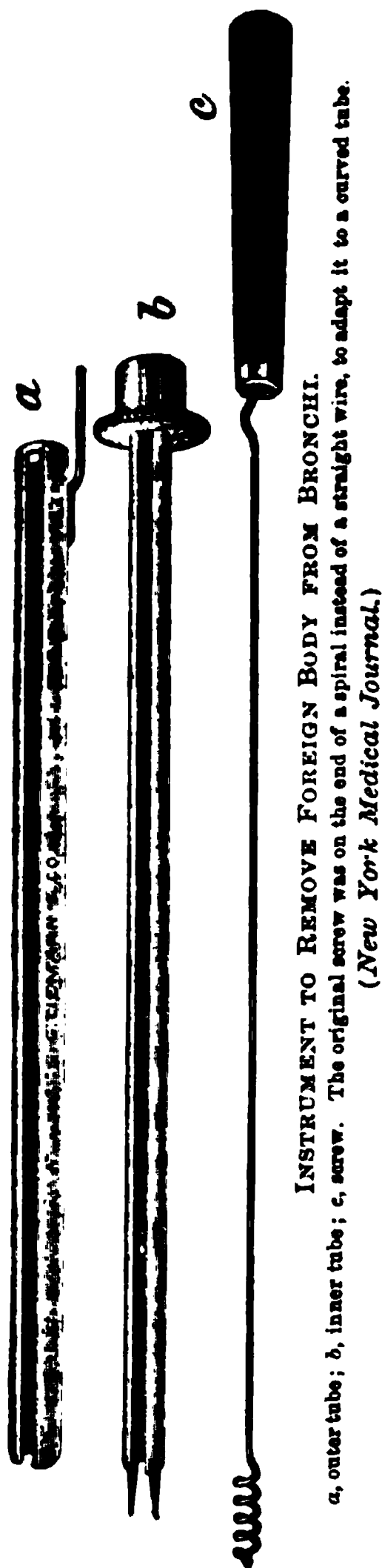
girl of 19 a needle attached to a feather. The needle was liberated by the aid of a probe introduced between it and the trachea. A case of sudden death from escape of milk into the air-passages is reported by Emile Müller,¹⁹ in a child 5 months old. The larynx, trachea, right bronchus, and all its divisions, were found filled with milk. Lennox Browne,¹⁹ reports an instance of a lady, 35 years old, from whose larynx he removed an impacted plate of artificial teeth, which had remained lodged in it for twenty-three months. Six weeks after its removal the patient had regained 23 pounds. William Macewen,¹⁹ reports a case in which a nut-shell lodged in the trachea for thirteen days was removed by tracheotomy during impending suffocation. When removed with the forceps, its concave surface was found to contain a mass of granulation tissue surrounding a portion of the kernel. I am informed by W. B. Parks, of Atlanta, that a child 1 year old got a water-melon-seed in the windpipe last July, which continued to excite cough and bronchial irritation, for which it was treated by several physicians without any relief. After coming under his care it took calomel, ipecac, and opium, followed by a mixture of carbonate ammonia and syrup of wild-cherry bark. On November 25th the seed was dislodged, covered with mucus, and the little fellow has been quite well since.

Sprengel²³⁶ ¹ maintains that the location of a foreign body in the bronchi can often be settled by means

BEAD IN TRACHEA. (SPRENGEL.)
(*Centralblatt für Chirurgie.*)

of auscultation. It is usually assumed that if the air does not pass into one lung the corresponding bronchus is completely closed by the foreign body, and if the closure is incomplete a sibilant sound will be heard on inspiration at the seat of impaction. Sometimes, however, such determination of the location of a foreign body is difficult. A case is cited of a little girl who suffered with dyspnoea on account of a foreign body in the air-passages. A sibilant inspiratory sound was heard over the right bronchus, while on the left side respiration was almost inaudible. Tracheotomy was performed, and a large, hollow bead, oval and open at each end, was found to occupy the entire lumen of the trachea, just above its bifurcation. The author supposes that one end of the bead was fixed

in the upper part of the right bronchus, and occupied a position to occlude the orifice of the left, so that the air could not enter the left lung while it passed through the tube formed by the bead into the right. Thus, a tubular foreign body fixed in the lower part of



the trachea may lead to the diagnosis of its fixation in one of the bronchi, and the absence of respiratory sounds over one side of the chest is not conclusive, unless it is known that the body is solid and not tubular. The somewhat sensational case of the Rev. Dr. G. W. Bothwell has been reported with all its details, including the autopsy, by J. D. Bushmore.¹ G. W. B., aged 41 years, clergyman, six feet and two inches in height, on April 18th, while holding a cork, half an inch in its widest diameter and seven-eighths of an inch in length, between his teeth, threw his head back, in laughing, and the cork dropped back into his pharynx. Violent coughing and efforts to remove the body with his finger finally relieved his breathing. On the 21st he submitted to inversion of the body without effect. On April 23d the first operation was done, under the influence of ether, and the second, third, and fourth rings of the trachea were cut. After a prolonged effort with Tiemann's œsophageal forceps the operator failed to extract the cork. Two or three other instruments of the same kind were then introduced, but with no better result. As respiration was impeded by the sinking in of the soft parts with each inspiration, a tracheal tube was introduced, and the

edges of the upper and lower angles of the wound were stitched together. On April 29th, the temperature being 99° F. (37.2° C.), pulse 100, respiration 18, a unique operation with the instrument shown in the wood-cut was done. The outer tube being introduced, the inner tube was next passed, and pushed forward to fix

the cork on the spikes. The screw was then introduced and twisted into the cork, but without extracting it, on traction. A further operation was abandoned, and the patient died, without relief, May 3d.

An operation is suggested by this case to M. Figueira,¹ for reaching the root of the lungs from behind. He seeks means of relief in this way when the foreign body has lodged so far below the bifurcation of the trachea, or so firmly that it cannot be extracted by instruments introduced through a tracheotomy wound. The thought of cutting through the chest-wall, and so reaching the root of the lung, naturally suggests itself. The anatomical relations of the primary bronchi, anteriorly, are such that it is anatomically impossible to reach them from the front of the chest. This is not, however, the case if we try to reach the primary bronchi from the back. The roots of the lungs are in relation behind, on the left side with the aorta, and on both sides with the pneumogastric nerves and pulmonary plexus. If the arm is thrown upward and forward, with the forearm across the front of the head, enough room can be had between the border of the scapula and the spinal column to cut down upon the ribs, resect two or three of them, and, by avoiding the aorta on the left and separating the nerves, to reach the bronchi. In his judgment the operation is anatomically possible, and not more difficult of performance than ligation of the innominate or the subclavian on the left side. He proposes to give the results of cadaveric experiments at a future day.

BRONCHOTOMY THROUGH THE CHEST-WALLS.

A number of experiments on dogs is given by De Forrest Willard,⁹⁹ in a paper laid before the American Surgical Association. An opening was made in the chest-walls, one or more ribs excised, and the bronchus reached either anteriorly or posteriorly. The operations were all fatal. He concludes that the risks from thoracotomy and bronchotomy, following unsuccessful tracheotomy, are much greater than the dangers incurred by permitting the foreign body to remain.

J. R. Weist said that, from a study of 1000 cases in which a foreign body was impacted in a bronchus, he had reached the conclusion that the chances of the patient were better if left alone than if the operation of bronchotomy was done. Howard Marsh

and Arthur Edward Durham, from England, agreed with the author of the paper, that the operation through the chest-wall was a dangerous and doubtful procedure. The proper thing to do, when there is clear evidence that a foreign body is impacted in the bronchus, is to open the trachea low down, and endeavor to remove the body or to facilitate its spontaneous expulsion. In the course of the discussion, S. H. Weeks reported the case of a child, 10 years old, in which he extracted, by tracheotomy, a screw-cap of a pocket-flask from the trachea. Kingston, of Montreal, reported a case of removal from the trachea of an artificial tooth with its attachments, where it had remained three months. The patient recovered perfectly.

TREATMENT OF HYDATIDS OF THE LUNGS.

A case of hydatid of left lung, treated by excision of piece of rib, with favorable result, is given by J. M. L. Davies.⁵⁵⁷ A case of hydatid of lung is reported by J. M. Pardey²⁸⁵ in a laborer, 33 years of age, who was admitted into Launceston Hospital on September 18, 1890. On the evening of September 21st the temperature was 102.6° F. (39.3° C.). Breathing embarrassed; collapsed; covered with cold sweat; pulse hardly to be felt; was given the A. C. E. mixture, and an opening made into the right pleura in mid-axillary line and small piece of the fifth rib removed. About half a pint of thin watery fluid, slightly purulent, was evacuated; drainage-tube left in opening; dressed antiseptically. September 22d, pleural cavity syringed out with Condyl's fluid; he coughed up some of this fluid. September 23d, temperature 99° F. (37.2° C.). A large mother-cyst and several smaller cysts of hydatid came away through the tube. October 30th, discharge slight; cavity holds about 3 ounces (93 grammes) of Condyl's fluid; gaining in weight and strength. Discharged November 14th, with small sinus in side, which afterward healed, and recovery was complete.

Bristowe²_{Dec. 20, '90} describes a case of death after exploratory puncture of thorax in a boy of 9 years, who was admitted into St. Thomas's Hospital on October 7, 1890. The post-mortem showed the lower lobe of the left lung adherent over an area of four square inches, and a cyst in the lung, which proved to be a hydatid, having a rent opening into the left bronchus. Phillips had collected records of 138 cases of hydatid of the lung, 13 of which had been operated on, with 9 recoveries and 4 deaths. Almost all the cases of the

138 left to themselves, without operation, had died. Bristowe, following the indications pointed out by the experience of Gardner, insisted upon a free opening, excising part of rib, rather than aspiration.

TUMORS OF THE MEDIASTINUM.

Eight cases of primary malignant growth of the anterior mediastinum are related by Letulle.³⁶⁰²
Dec., '90; Sup., Dec. 20, '90 The patients were all over 40, with the single exception of a woman aged 23,—a very acute case of carcinoma. Two were over 60. The history of illness dated from not more than six months. The disease was accompanied by pleural effusion in 4 cases, purulent in 1, and chylous in another. The fluid in the latter case was like sero-pus, but, under the microscope, many fat-globules and very few pus-cells were seen. Œdema of the parts above the diaphragm was present in 4 cases, twice on both sides. Four of the patients died suddenly. Their invasion of the mediastinal pleura was from above, and the growth, in 2 cases, was lymphadenoma; in 3 others, sarcoma; 2 others were carcinoma,—1 being a squamous epithelioma. With the exception of tumors formed of a number of individual glands, it may be concluded that primary malignant growths of the anterior mediastinum take their origin from the thymus gland.

A case of sarcoma of the anterior mediastinum is noted by W. Snowball,²⁸⁵
Nov., '90 in a boy aged 12, who was admitted into the Children's Hospital, November 10, 1889. On November 22d, the patient was seized with dyspnœa, and died in about five minutes. The autopsy showed a massive, nodular growth adherent to sternum and cartilages, pressing upon the trachea and right bronchus. An interesting account of primitive cancer of the mediastinum is given by M. Fernand Besançon,⁷
Nov., '90 in a woman aged 78. She was seized with fever and pain in the left side on March 8th, and treatment began March 23d. On the right and behind there was dullness above the inferior third, with diminution of thoracic movement, shallow breathing, feeble vesicular murmur, ægophony, but about the middle third the resonance was preserved and the vesicular murmur distinct. Having an increase of dyspnœa and dullness below, with diminution, amounting to cessation of the respiratory murmurs at the base, an exploratory puncture was made on the 30th, followed by thoracentesis. A litre

(1 quart) of fluid was withdrawn March 30th, and again April 9th, the discharge being rich in fibrin. Death followed on the 17th of April. The autopsy showed a cancerous tumor, formed of two masses, in the anterior mediastinum. Anatomical examination revealed a primitive pleuro-pulmonary cancer, with secondary pleurisy. In the upper lobe of the right lung there was found, upon incision, an abundance of pus. The tumor was situated in front of the right auricle, resting against the left common carotid artery at its origin, and extending upward to the breadth of five or six fingers.

E. S. McKee⁸⁴⁹ refers to a case of carcinoma of the mediastinum, reported by Tissier, as occurring in a young woman 27 years of age. The patient died of cyanosis, and the autopsy showed a neoplasm, which occupied the anterior and superior part of the mediastinum.

Napier and Steven report a case of mediastinal tumor, in which the post-mortem examination showed a large, dense mass filling the anterior and posterior mediastinum and enveloping the heart, which was lodged in a cavity on the left side of the growth. Two cases of intra-thoracic tumor, reported by Graham Steell,⁹⁰ may be briefly presented. Case I: E. P., aged 26, a married woman, came under observation July 17, 1890, in the Manchester Royal Infirmary. Her illness began with a severe cough, and on two or three occasions she spat a small quantity of blood. On the 22d of July she complained of pain on the left side, which continued until her death, on September 27th. The autopsy revealed a mass of reddish-gray tissue, continuous with a growth of the posterior mediastinum, about the size of an orange. It was located between the aorta behind and the right and left bronchi in front, reaching as high as the lower end of the trachea and as low as the origin of the sixth intercostal artery. Microscopically, the tumor was found to be a lympho-sarcoma. Case II. The second case is that of a lad, aged 18, who was admitted into the infirmary June 28, 1889, and died a week later. In the post-mortem report it is stated that a large growth of irregular shape was found in the anterior mediastinum, between the manubrium of the sternum and the upper lobes of the lungs. The principal mass was about the size of an orange, and lay in front of the trachea just above its bifurcation, extending backward around the

sides of the trachea and between the bronchi, so as completely to surround and compress the bronchi—the right more than the left—and to flatten antero-posteriorly the lower part of the trachea. The lowest part of the growth was continued into the lung, and projected more to the right than the left. Microscopically, the tumor was found to be a lympho-sarcoma.

The pathology of mediastinal tumors, with special reference to clinical diagnosis, is treated of, elaborately, by John Lindsay Steven.²¹³ He introduces a number of interesting cases in illustration of his views, but the space allotted to this department only admits of a brief description of two cases, one being a limited lympho-sarcoma of the mediastinum involving the vena cava superior, with characteristic localized œdema and venous engorgement with secondary nodules in the lung; the other was a tubercular tumor.

A. F., aged 60, a laborer, was admitted to the Glasgow Royal Infirmary on the 23d of September, 1890, complaining of cough, shortness of breath, and a choking sensation in the throat. He is described as presenting a flushed and bloated appearance, with considerable œdema about the lower eyelids. The temperature was normal, the pulse 82, respiration 18, with wheezing, a prolonged and feeble respiratory murmur, accompanied by snoring râles in expiration, which at the base was associated with mucous râles. The face, neck, upper part of chest and arms were markedly œdematous. The veins in the neck were greatly distended, but there was no pulsation of the jugular fossa. He grew rapidly worse, the obstruction to the venous circulation soon giving rise to serious cerebral disturbance. He first became delirious and then comatose, and died October 14, 1890.

Upon post-mortem examination, it was found that the costal cartilages were calcified, and, on raising the sternum, a lobulated tumor was found in the mediastinum, above the pericardium, and a little to the right. On cutting into the lungs, a few secondary nodules, resembling the primary-tumor tissue, were found in the right lung. The thoracic organs, including the tumor, being removed, the neoplasm presented a remarkably isolated nodular mass, four and a half inches long, three inches from before backward, with a cross-measurement of two and a half inches. The tumor occupied the right side of the upper portion of the anterior, middle,

and posterior mediastinums. The cut shows its relations to adjoining structures. Microscopic examination of the tumor showed a characteristic lympho-sarcomatous structure. The relation goes on to state that tubercular tumors are probably among the most frequent of the tumor formations of the mediastinum, and may give rise to very serious results, as appears in the example which follows: Miss —, 39 years of age, and menstruating regularly, had, when 19 years old, suppuration of the cervical glands on the

A

C

C''

D

TUBERCULAR TUMOR OF THE ANTERIOR MEDIASTINUM.

A, tumor; B, heart, with right ventricle laid open; C', C'', right and left lungs; D, anterior layer of pericardium turned to the left.

left side, which had left several cicatrices. She was subsequently seized with an intolerable itching all over her body and pains in the muscles, which were not benefited by treatment. There was an enlarged gland about the size of a pigeon's egg in the infra-clavicular space on the right side. On percussion, an area of dullness was found, of about three and a half inches in diameter, under the sternum, and extending equally to both sides. The signs of an intra-thoracic tumor seemed to be conclusive, and the diagnosis

was lymphadenoma in the anterior mediastinum. She came under the care of Steven, on October 4, 1889, and died on the 9th of the following December. The autopsy showed, on raising the sternum, a large, white-colored tumor, about four inches in diameter, occupying the upper portion of the anterior and middle mediastinums. An enlarged gland, about the size of a hazel-nut,

A

D

LYMPHO-SARCOMA OF MEDIASTINUM.

A, tumor; B, left innominate vein; C, heart, with a portion of pericardium; D, root of left lung; E, arch of aorta and great vessels; F, left pneumogastric nerve; G, trachea.

lay beneath the right clavicle. The right innominate vein and the superior vena cava adhere to the posterior surface of the tumor, while the left innominate vein passes through it. The relations to the surrounding viscera are seen in the cut. Microscopic examination revealed the tubercular nature of the mediastinal tumor.

Steven holds that the term "lympho-sarcoma" indicates that

variety of sarcoma which, by its naked-eye appearances and its histological characters, is to be looked upon as originating in connection with the lymphatic glands, *i.e.*, a sarcoma of the lymphatic glands. It is noted, however, that the sarcomatous tumors may originate within the chest in connection with other tissues, and may originate in the subpleural tissue and grow into the mediastinum. He further dwells upon the relationships of mediastinal tumors with neighboring and distant parts, such as the pulmonary tissue, the trachea, œsophagus, and the blood-vessels, with the mucous structures. He cites the fact that Hilton Fagge calls attention to interesting vasomotor and papillary phenomena due to the pressure of mediastinal new growths upon the sympathetic trunk within the chest. In considering the relationships between sarcoma of the mediastinum and distant parts, it should be remembered that sarcoma of the mediastinum may be divided into primary and secondary. Of all the primary sarcomata, the variety known as lympho-sarcoma is the most prone to metastasis. Metastatic nodules, having all the characters of the primary thoracic mass, may be found in the lungs, the liver, spleen, and kidneys. Of all malignant tumors, the sarcomata are most likely to be complicated by the development of secondary tumors in the chest. Instances are given of sarcoma in the chest secondary to primary tumor of the testicle and primary tumors of the femur, after their removal.

SURGICAL PENETRATION INTO THE POSTERIOR MEDIASTINUM.

In order to open the posterior mediastinum, Quenu¹¹² and Hartmann advise a vertical incision fifteen centimetres long over the angles of the ribs, between the spinal border of the scapula and the vertebral column, about four fingers' breadth from the spine, the middle of the incision corresponding to the spine of the scapula or to a point a little below it. On reaching the trapezius it is possible, by retracting its inferior border upward and inward, to avoid sacrificing more than a few of its fibres. The ribs are then divided and resected for about two centimetres. This small resection of three ribs suffices to permit the hand to penetrate into the posterior mediastinum by stripping off the pleura. The opening made in the thoracic wall extends from the inferior border of the second rib to the superior border of the sixth. By retraction of the ribs it is

possible to see and to explore the hilum of the lung, the aorta, and that portion of the œsophagus which extends from the root of the bronchus to the diaphragm. If the pleura, instead of being stripped off, is incised, the upper lobe of the lung and even the summit of the thoracic cavity are easily accessible, much more so than by resection of the ribs below the clavicle. The experience of the writers has taught them that it is better to approach the mediastinum from the left side than the right, on account of the anatomical arrangement of the pleura. They claim that the practical application of their researches opens the way for surgical intervention in abscesses of the mediastinum and in compression of the bronchi by certain ganglionic tumors.

CHYLOTHORAX.

An interesting case of idiopathic chylothorax is reported by Neuenkirchen,² in a single woman aged 45, attended with dyspnoea and ultimately with cessation of menses. About a litre of milky fluid was removed from the left pleura in 1884, and again from the right pleura in 1888. The patient, in the meantime, is enjoying good health. A case of chylothorax of traumatic origin came under the observation of Alvin Eger,⁵⁹ in a man 28 years old, on December 17, 1890. After suffering from injuries to the thorax and abdomen, soreness upon pressure was found directly above and somewhat behind the anterior superior spinous process of the right ilium, accompanied by fluctuation. An opening gave exit to an offensive discharge, which lost its bad odor within a few days and assumed an opaque and milky character. Emaciation soon manifested itself, and his body-loss, from the date of formation, on the seventeenth day, to his death, on the thirty-eighth day, exceeded four pounds *per diem*; and the entire loss exceeded over half his normal weight.

Upon making a post-mortem examination, a hole was found in the thoracic duct, and the microscope showed that a creamy clot in its vicinity abounded in chyle-corpuscles.

PERICARDIAL EFFUSIONS.

Handford² relates a case in which 11 ounces of coffee-colored fluid were removed by aspiration from the pericardium. The patient was relieved for two days, but died three days and a half

after the tapping. The autopsy showed thickening of pericardium, which contained 40 ounces (1240 grammes) of fluid.

Shattuck,⁹⁹ reports a case of paracentesis of the pericardium with recovery. Davidson,² gives the details of a case in which an incision was made into the pericardium and 8 ounces of pus evacuated. A drainage-tube three and a half inches long was inserted. Relief was afforded, but the patient died seven days afterward. R. F. Beckman and S. S. Stoll,¹⁰⁰ give a rare case, in which pericardiotomy was done, after trephining the sternum, with a successful result. Davidson records another case, in which pyopericardium was complicated with empyema in a child 6 years old, and an incision into the pericardium with the use of a drainage-tube was entirely successful. Hermann Bronner,² relates a case of pus in the pericardium treated by incision and drainage, in a girl aged 11, which promised well, but terminated fatally after the lapse of twenty-five days. An instructive case is reported by W. G. Scott,⁵⁵⁷ in a male child 6 years old, in which a purulent collection was removed from the pericardium by incision and drainage, with subsequent irrigation of the sac with a 1½-per-cent. solution of carbolic acid. The boy made an uninterrupted recovery, and is well and strong. He also records the case of a boy, 12 years old, with pericardial effusion, in which an aspirating-needle was inserted about an inch to the left of the sternum, in the fifth intercostal space, and slowly withdrew 15 ounces (453 grammes) of slightly blood-stained serum, with a favorable result.

PNEUMOTHORAX.

A case of valvular pneumothorax is reported by Alfred Mantle,²² in a coachman, 28 years old, who was suffering with phthisis. Aspiration for the removal of the air gave only partial relief, and an incision in the fifth intercostal space on the left side, with the insertion of a drainage-tube, proved beneficial. But at the end of a week he died of heart-failure, and at the autopsy it was found that the aperture leading from the vomica was guarded by a valve formed of the pleural membrane. F. W. Zahn,²⁶ in treating of the origin of pneumothorax from rupture of the visceral pleura, without suppurative inflammation, classifies the cases thus: 1. Pneumothorax due to rupture of emphysematous bullæ. 2. Pneumothorax due to bursting of interstitial emphysematous

-bullæ. 3. Pneumothorax due to the tearing of the pleura near old adhesions. 4. Pneumothorax due to atrophy of the pleura. Unless death is otherwise brought about, the perforation heals and the air is absorbed, so that aspiration should not be resorted to unless the intra-pleural possesses life, and then it must be done with care. A case of spontaneous pneumothorax and pneumopericardium is presented by R. A. Lundie,⁹⁶ Aug. which he attributes to extremely delicate tissues. But the discussion by James and Smart leads to the conclusion that the result was tubercular. Pneumothorax had occurred in the ordinary way, and the strain on the adhesions between the lung and pericardium had caused a rupture through them into the pericardium and escape of air into it from the pneumothorax. They healed rapidly.

SEROUS EFFUSION IN THE PLEURA (HYDROTHORAX).

The most important modification in the treatment of serous effusion during the past year is a resort to free incision of the thoracic wall. Scharlau⁵¹ reports the case of a boy having, at the outset, several ounces of serous fluid taken from the right side by aspiration. But, not being materially benefited, an incision, two inches long, was made in the sixth intercostal space, posterior to the axillary line, opening the pleural cavity with the blunt-pointed scissors. The child was cured in five days, and he prefers this process to aspiration in recent cases with compression of the lung and displacement of the heart, but would not recommend it for every case of serous effusion into the pleural cavity.

Arthur P. Rony⁹⁹ Aug. 27 states that, in the case of a laborer 27 years old, he drew off by aspiration from the left pleural cavity, at one sitting, 129 ounces (4000 grammes) of fluid. As an offset to the above, G. E. Coulthard⁹⁹ Sept. 3 reports having evacuated, with the aspirator, 224 ounces (6750 grammes) of fluid from the right pleura of a young man 25 years of age. In treating the acute stage of pleuritic effusion, George P. Jenkins⁹⁹⁸ June claims that the important indication is to cause the adhesion of the two pleural surfaces, and thus prevent serous collection. A great deal can be done with this view by strapping the chest with heavy adhesive plaster, until the entire half involved is completely covered. This very materially lessens expansion, and, by holding the two pleural surfaces in contact, assists decidedly in bringing about adhesion.

EMPYEMA.

The retrospect of the operative measures which have been resorted to heretofore for the relief of purulent collection in the pleural cavity manifests a disposition to question the propriety of the extensive resection of ribs. Camille Moreau, having made some strictures upon Estlander's operation before the Belgian Academy of Medicine, and others having criticized it as unnecessary in many cases, a committee, with M. Deroubaix as chairman, presented a report upon their communications.⁵² It sets forth that, while the operation of Estlander occupies a legitimate place in surgical practice, its use is not absolutely necessary in all cases of extensive and protracted empyema, and that the tact and the judgment of the surgeon ought to prevail in practice. Furthermore, it is demonstrated that the mechanism of the case of empyema does not always depend upon the retraction of the thoracic walls.

Quenu and Wagner have urged section of the ribs without resecting them, and, though Estlander suggested the idea, Quenu first performed the operation. It has also been done by G. Richelot,¹⁷ since, on March 16, 1891, with relief in an extensive empyema, and he styles it *Quenuthoracoplastie*. Subsequently, Moreau performed the same operation three times. Koenig remarks that only in extremely rare cases is the persistence of fistula due to the defect of expansibility of the lung and to the impossibility of the further retraction of the thorax. Though Berger got 10 cures and 5 improvements out of 26 cases, the author doubts the necessity of these operations.

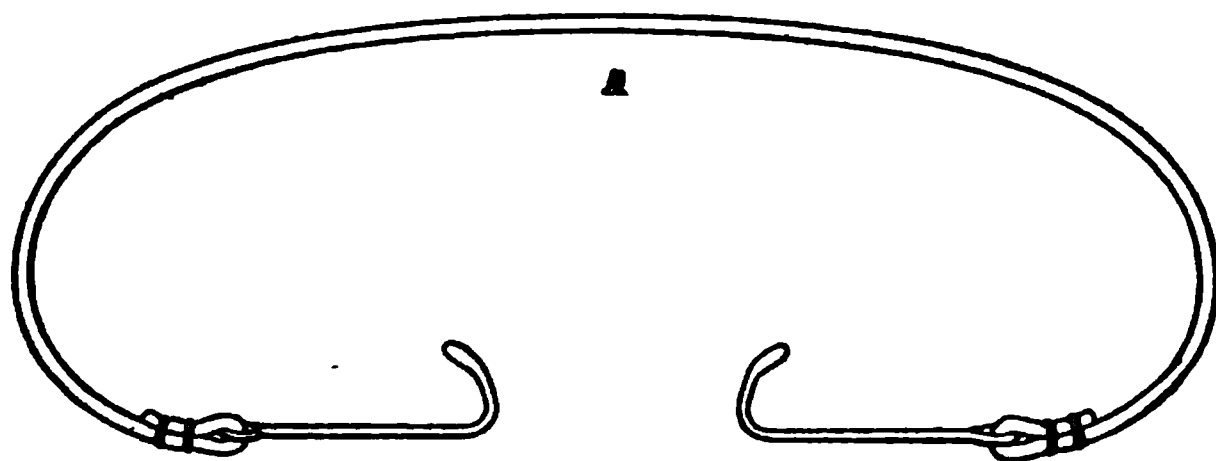
During the past twelve years, Koenig¹⁶¹ has performed thoracotomy in 76 cases of empyema, of which 89 per cent. were cured. Only 6 of these were in the hospital more than three months; about 71 per cent. were able to work within two months. Among these were 28 children under 12 years of age. The point of election for the incision is the lateral surface of the thorax, just below the axilla, selecting the fourth, fifth, or sixth rib. A tube carried in at such point will always enter the free cavity, and, with the patient in the proper lateral position, allow the pus to flow out, a portion of a rib, about $1\frac{6}{8}$ inches, being previously removed. If disinfectant washes are indicated, salicylic- or boric-acid solutions are preferred. A bandage covering the whole thorax

is used, in connection with special movements of the body and rest in bed on the side, inclining to the back.

J. W. Long⁴³ mentions a case having a perforation through a bronchial tube. He made an incision between the seventh and eighth ribs, and put in two drainage-tubes, after evacuating much pus. There was no more expectoration, and he left the woman in a convalescent state.

Bahnsen states that, in his limited experience of 7 cases of empyema, all had recovered without the resection of ribs, but simply opening the ribs, with a pair of bone-forceps, enough to permit the entrance of the drainage-tube. A counter-opening being made, the tube was passed through both, and the patient was left to get well. James A. Goggans⁹ states that, during the last eighteen months, he had treated, surgically, 6 cases of empyema which developed in the wake of pneumonia, all of which have made perfect recoveries.

In a case of empyema, Hal C. Wyman²³⁴ adopts measures out of the ordinary course of treatment. The seventh rib was exposed



HOOKS FIXED ON RUBBER TUBE.
(*American Lancet.*)

at its middle, about one inch being removed with a pair of bone-forceps. The cavity was now freely exposed and the rib divided, so that the cavity could contract and heal. The cavity was packed with dry, sterilized gauze, over which were sprinkled about 10 grains (0.65 gramme) of a mixture of iodoform (1 part) and boracic acid (7 parts). The patient rallied well and improved in general health; but, with the intention to keep the chest well open, hooks, fastened in each end of a rubber tube passing around the body, were introduced into each angle of the wound, as shown in the cut.

An empyema-tube, devised by Herbert Higgins,² fulfills the indications for drainage. The inner tube is made of silver; it is

about four to five inches long, and is firmly attached to an ordinary rubber tube of the same calibre. In dressing the wound, gauze should be wound around the expanded portion, to keep it from contact with the skin. This tube cannot fall out, if the dressings are firmly secured, as it must come out four to five inches before it can

HIGGINS'S EMPYEMA-TUBE, WITH FLANGE.
(*British Medical Journal*.)

bend, and it may be kept in by a tape passing around the chest. It prevents the pressure of the ribs from occluding the tube, thereby rendering resection unnecessary. It does not slip into the chest-cavity, and it may at any time be easily removed and re-attached, after insertion into the opening.

ABSCCESS OF THE LUNG.

William Porter⁸⁵ states that, while there may be many causes that predispose to pulmonary abscess, the positive causes, aside from traumatism and foreign substances, are easily divided into three classes: (1) inflammation within the lung; (2) perforation of pus-cavities from without, as, for instance, from liver or pleural sac; (3) embolism from right endocarditis, or from the systemic veins.

Following the procedure of Runeburg, in excising a large piece of rib directly over the cavity and making a free opening into the pleural sac, he advises that a much smaller incision should be made into the pulmonary tissue. He gives the favorable result of this mode of operating in 2 cases of abscess in the left lower lobe of the lung. The cavities were kept thoroughly washed out with a weak carbolic-acid solution, and in each case complete recovery ensued. The result of such operations, he remarks, indicates the value of this comparatively new field for surgical investigation. Fenger and Hollister reported 6 cases, 1 of which (their own) recovered. Runeburg collected 11 cases of abscess of the lung; 2 recovered, and in 3 the diagnosis was doubtful. In the 3 fatal cases, death could not be attributed to the surgical

operation of pneumotomy. Porter claims that abscess of the lung presents signs and symptoms which admit of a positive diagnosis, and that operation is often demanded.

At the recent Congress of Tuberculosis, a paper was read by M. Poirier²_{Sept. 19} on the surgical treatment of pulmonary cavities. In conjunction with M. Jonnesco, he has collected the following statistics: Of 29 cases of incision of tuberculous cavities, with resection of ribs, improvement took place in 15, cure resulted in 4, in 9 the result was negative, in 1 it was unknown. In 19 of the cases the disease was situated in the apex. The best way of reaching the upper part of the lung is by an incision with the thermo-cautery four centimeters below the sterno-costal notch, from the middle line of the sternum outward for nine centimetres, in a direction parallel to the first intercostal space. In this way the plane of the intercostal muscles is reached, and, being divided, the pleura is exposed. If there is a cavity, adhesions are always present, and it is easy to strike the cavity through these adhesions. The point of the instrument, passing through the first intercostal space, should be carried from below upward and from before backward. When the cavity lies toward the back, the spinous process of the seventh cervical vertebra should be sought; an incision is made outward from this point toward the scapula; the trapezius and rhomboideus are divided, and the first intercostal space, which is narrower than in front, is thus reached. Resection of rib may be necessary, but this is not called for in front resections.

F. W. Greene⁹⁰_{Nov.} reports a case of pulmonary abscess, in which an incision was made parallel to the ribs, an inch and a half long, with discharge of half a pint of pus, and closed on the twelfth day, with complete cure.

PNEUMOTOMY.

J. E. Thompson⁹⁰_{Aug.} presents a synopsis, in which "Lung Surgery" is contemplated from two points of view by Krecke: first, from the kind of operative procedure used, and, second, from the form of the lung affection. Only those cases in which the knife is used are to be considered as surgical cases.

Gangrene of the lung is the affection which is, *par excellence*, amenable to surgical interference. The presence of empyema makes an opening into the pleural cavity necessary; after letting out the pus, portions of one or two ribs are resected, and, if an

irregular indurated spot is found on the surface of the lung, it is laid open carefully with a thermo-cautery. Notwithstanding the high mortality, he advises operation in all cases. Slawyk had 14 cases and 8 recoveries. Seitz had 19 cases and 4 recoveries. In cases of abscess of the lung, the same rules held good. Slawyk, out of 13 cases, had 3 recoveries. Seitz showed 11 cases, with 5 cures. Surgical interference ought only to be undertaken when single cavities are known to exist. Krecke lays great stress on some points of technique: 1. Always use a blunt instrument to perforate the lung. 2. In deep-seated foci, use the thermo-cautery. 3. Use tampons of sterilized gauze for plugging a cavity. 4. All washing of cavities should be discountenanced. To obviate the entrance of air into the pleura, in the performance of pneumotomy, Roux,⁹_{Oct. 19} in a case in which he opened a tuberculous cavity in the lung, united the two layers of pleura by means of a continuous suture, thus preventing the entrance of air.

PNEUMONECTOMY.

The importance attached to the operation of pneumonectomy is demonstrated by the notices in journals of different countries of the excision of the apex of a tuberculous lung, by Tuffier,⁸_{May 16;}¹⁹_{Nov. 20} in March last. In his communication to the Société de Chirurgie, Tuffier gave the details of the operation on the patient, after having satisfied himself of its safety by a series of experimental operations on the lower animals. The *modus operandi* was as follows: A cushion being placed under the back, so as to efface, as much as possible, the subclavicular fossa, an incision was made through the second intercostal space to within half an inch of the sternum; the great pectoral and intercostal muscles were similarly incised and the pleura brought to view, which, being cut in turn, the tissue of the lung appeared. The operator then passed in his finger, and detached the serous membrane above and without with comparative ease; but when he reached the inside the membrane yielded, and immediately a hissing sound occurred, indicating an escape of air and the formation of a pneumothorax. Passing his finger behind the summit of the lung and seizing the tissue with a special flat forceps, he drew it forward and threw a ligature around it, and fixed the pedicle to the periosteum, on the internal side of the second rib. The man made a rapid recovery.

SURGERY OF THE ABDOMEN.

By J. WILLIAM WHITE, M.D.,

PHILADELPHIA.

STOMACH.

Gastrostomy.—O. Witzel, of Bonn, ³³⁶_{Aug. 5}; ²_{Sept. 5} describes a modification of the technique of gastrostomy, devised with a view to prevent the escape of gastric juice, which in many instances causes so much trouble after this operation. The object is to establish a canal, formed by stitching together the free borders of two parallel folds of the exposed wall of the stomach. This canal extends obliquely from the right downward and to the left, where it communicates with a small opening made into the interior of the stomach. It is necessary to draw a large extent of the anterior wall of the stomach through the external wound. This, it is stated, can be readily effected, when the stomach is collapsed, by gentle and prolonged traction. Two parallel folds are then taken up, the free margins of which are brought together by three or four Lembert sutures and by numerous ordinary sutures, over a flexible tube of the thickness of a lead-pencil, the lower end of which tube is inserted into the small opening made into the stomach, whilst the upper end is intended to project from the external wound. This canal should be about four centimetres in length, and is left exposed at the bottom of the wound when the stomach is fixed by sutures to the margins of the external incision. This modification does not necessitate any change in the other steps of the operation, and the surgeon can make the external wound according to his usual practice. He has operated in this manner on 2 patients, and has good reason, he states, for being well satisfied with the results, and believes that his expectation of establishing a gastric fistula capable of being effectually closed by valvular action has been fulfilled. A similar procedure would, he thinks, be found useful in forming a supra-pubic vesical fistula.

Terrier and Louis,⁹¹ of Paris, considering how certain inconvenient results observed in cases of recovery may be prevented, concludes that those due to the presence of a gastro-cutaneous fistula may be avoided by opening the stomach as near as possible to the superior curvature, by making only a small orifice, and by dispensing with the subsequent use of occluding agents; then simple dressings only will be needed, and these should consist of inert powders, or of such (carbonate of magnesia, for instance) as are capable of neutralizing any drops of gastric fluid that might be discharged during any forcible effort made by the patient. The results of gastrostomy with regard to the survival of the patient are influenced, they state, by the duration of the disease and the extent to which the stomach is involved.

C. Lauenstein⁸³⁶,² No. 27, July 26 holds that, from a therapeutic point of view, a clear distinction should be made between cancerous stenosis of the lower part of the œsophageal canal and cancerous disease about the cardiac orifice of the stomach. There can be no doubt, he states, that the formation of an external gastric fistula, in cases of cancerous obstruction in the lower part of the œsophagus, often does much good by averting death by starvation. In cases of cancerous disease at the cardiac end of the stomach, on the other hand, there are several reasons why gastrostomy should not be performed. There are, the author points out, two conditions necessary for the success of this operation. The stomach must be capable of retaining its fluid contents, and also of digesting such nutriment as is introduced by the fistula. In cancer of the œsophagus there is but little, if any, interference with the function of digestion, and the discharge of gastric fluid from the fistula, which frequently causes so much irritation in the surrounding skin, may be avoided by making the orifice in the stomach as small as possible.

Von Hacker, of Vienna,⁸³⁶,² No. 27, Oct. 17 is opposed to Lauenstein's conclusion that extreme cancerous constriction of the cardiac orifice of the stomach is an absolute contra-indication to gastrostomy. Whilst recognizing the importance, from scientific and diagnostic points of view, of distinguishing cancer of the lower part of the œsophagus from cancer of the cardiac orifice of the stomach, he holds that such attempts at localization have no bearing on the choice of treatment. He gives brief notes of 6 cases, which show that gastrostomy performed as a palliative plan of treatment may be

attended with results just as good in cancer of the cardiac orifice, even when a tumor can be felt in the epigastrium, as in cancer of the lower end of the œsophagus. In comparing these 6 cases with 9 other cases in which he performed gastrostomy for cancer of the œsophagus, he can find no difference between the two series with regard to the feasibility of the operation. The fistula was as readily established in one set of cases as in the other, and an equal prolongation of life was attained.

Following gastrostomy for cancerous stricture of the œsophagus, by Willy Meyer, of New York,¹—performed after the method of von Hacker,—everything had closed down upon the tube in healing, and there had been no leakage for some time, when the juices of the stomach began to digest the walls of the fistula slightly. The patient not affording the more elaborate mechanical devices which had been advocated as preventing leakage, Meyer directed him to take his tube out at night, eight hours after the last meal. Since this had been done there has been no more leakage. The patient was in excellent condition, and there are no evidences of recurrence of the disease as yet.

O. F. Mercier, of Montreal, Canada,¹²² says that Reclus considers cough as one of the most important contra-indications for gastrostomy. The gastric juice is almost invariably forced out of the stomach by the spasmodic effort, and, pouring out over the wound, arrests cicatrization and induces an ulcerative process that is very difficult to arrest.

A. Heydenreich, of Nancy,³ reviews the subject of gastrostomy, and reports a case performed by himself for the removal of a foreign body. He quotes the 32 cases of foreign bodies in the stomach mentioned by Poland,²¹⁵⁹ in which no operation was performed, with 37 per cent. deaths, and compares this with Collin's results in 15 cases of gastrostomy for foreign bodies, with 20 per cent. deaths. Cases were also reported as follows: 2 for stricture of the œsophagus, by Southam, of Manchester, England,⁶; 1 for cancer of the œsophagus, by A. R. Anderson,²; 1 for stricture of the œsophagus, by H. J. Rope, of Shrewsbury, England,⁶, who notes expulsion of bile-stained, very acid fluid through the wound during severe spells of coughing from which the patient suffered, and giving rise to irritation of skin around incision; 1 for cancer of the œsophagus, by Henri Hartmann, of Paris,⁷ who also

alludes to 6 as yet unpublished cases by Terrier; 1 for stenosis of the œsophagus, by C. A. Powers, of New York, Feb. 7, ¹; 6 for cancer of the œsophagus, by J. Duncan, of Edinburgh, Scotland, Apr. ³⁶; 1 for cancer of the œsophagus, by A. A. Lendon, of Adelaide, Australia, May ²⁶⁷; 1 for stricture of the œsophagus, by Page, July 19, ²²; 1 for stricture of the œsophagus, by R. F. Weir, of New York, Sept. ¹⁵¹; 1 for malignant stricture of the œsophagus, by M. Moullin, Oct. 10, ⁶; 1 for carcinoma of the œsophagus, by Hanford, of London, Oct. 21, ² and 1 for stricture of the œsophagus, by Arch. Dixon, of Henderson, Ky., Dec. ¹³⁸.

Gastrotomy.—D. Lowson, of Bath, Jan. 21, ⁶ performed this operation for the removal of a skewer, seven and one-half inches in length, connected transversely with a piece of clay-pipe, two and one-half inches long, in an insane patient. The skewer had penetrated the thoracic wall, projecting some distance, but, owing to its connection with the piece of clay-pipe, could not be withdrawn through the parietal channel it had created.

To illustrate the degree of traumatism which the gastric organs are sometimes capable of standing, J. H. Conoway, of Endora, Ga., Mar. ²⁷¹ reports a case of gunshot wound of the stomach, in which the viscus had been penetrated from behind, the ball having entered about two inches above the kidneys and about three inches to the left of the column. Profuse hæmatemesis occurred, the bullet coming up during one of the paroxysms. Anodynes and rectal feeding were the only means resorted to. In sixteen days the patient began to eat, and soon after resumed work. J. B. Laffan, of Carnarvon, West Australia, Apr. 15, ²⁶⁷ reports a case presenting much analogy to the above, the weapon being a five-inch sheath-knife, which had penetrated the stomach up to the hilt. The treatment adopted was to give large doses of laudanum at frequent intervals, milk and soda when thirsty, the patient being kept quiet. A pad of dry lint was fixed over the external wound. This dressing was removed on the third day, and the wound was found to be healed. No further vomiting occurred, and the man was discharged cured in ten days. He has since been hard at work, and, beyond occasionally a slight fluttering sensation in the stomach, is apparently none the worse. He compares this result, to which may be added the preceding, with the teachings of text-books in relation to such injuries, the sequelæ mentioned being "vomiting, collapse, and death."

Gastrectomy.—Porges⁸,^{Feb. 12, May 112} showed, from the clinic of Maydl, a man who had a large portion of his stomach removed for carcinoma of the greater curvature. He had been emaciating for a year, and a tumor the size of a fist was felt in the gastric region. Other symptoms were mostly wanting. Under chloroform, a transverse incision, nearly eight inches long, was made two fingers' breadth beneath the processus xiphoideus, from the middle of the right rectus abdominis to the left costal cartilage. The stomach was drawn out, the cardiac and duodenal ends tied with iodoform gauze, and the tumor and stomach, up to within one and a quarter inches of the gauze ligatures, removed by transverse incisions. The removal of the adherent pancreas was somewhat difficult, and required six ligatures. The lesser omentum was in parts ligated and cut away. From the greater omentum a soft, oblong gland was removed. The two cut ends of the stomach were united by sutures in terraces. The operation lasted one and three-quarter hours. The patient was collapsed, but recovered, and increased forty pounds in weight. The resected piece was 7.2 inches long and 7 inches broad.

Billroth said that such an operation could only be called a total extirpation when the cardia and pylorus were united.

Kahler remarked that experiments on dogs showed that they could live after extirpation of the stomach, and that there were observations which demonstrated that man also could be nourished without its aid.

Maydl²²,^{May 12} described a case of carcinoma of the stomach, in a woman aged 47, in whom resection was performed in the usual way, the patient kept in hospital four weeks, and then dismissed to attend as out-patient. The section taken from the lesser curvature of the stomach measured 12 centimetres, from the greater curvature 13.5 centimetres. The thickness of the section from mucous membrane to the serous over the site of the tumor ranged from 15 to 10 millimetres, the healthy organ not exceeding 3 millimetres. The mucous membrane over the morbid surface was thrown into deep folds fixed in the base of the folds. A large fold of this membrane fell through the pylorus into the duodenum, which produced a stenosis. The original cause seems to have been long congestion, with ulceration, ultimately healing, with hypertrophy of muscular part and contracting cicatricial tissue. The muscular

hypertrophy and invagination into the pylorus is the cause given for the stenotic closure.

Pollosson, of Lyons, ²¹¹_{Nov. 15} publishes an unsuccessful case of resection of the pylorus and of a portion of the great curvature for cancer of the stomach. In this author's opinion, the operation of resection of the stomach is a very severe one, and should only rarely be attempted. In the above patient he considers the circumstances were very favorable. The tumor was very movable, and its limitations were well defined. The general condition and absence of cachexia were against secondary infiltration, and the autopsy showed that there were no secondary deposits. He considers that it will be a long time before he again meets with such an assemblage of encouraging signs. He maintains that it is these exceptional cases alone which should be operated on, and then the sooner we intervene the better the chances of success. He advises practicing the operation on the dead body, so as to learn to stitch quickly and well.

Billroth ⁸_{Aug. 20}, ¹¹²_{Nov.} gives the result of 124 cases of resection of the stomach and intestinal canal, of gastro-enterostomies, and of removal of scar-tissue for chronic diseases, performed in his clinic and private practice from November 1878, to June, 1890. After detailing at length the groups of cases, he remarks that in the total results attained by him (excepting the resections of the small intestine and rectum, in which the operation in no case proved fatal) one-half of those operated upon survived. In all his cases of resection of the bowel or of gastro-enterostomies Billroth used sterilized silk, with which he stitched serous membrane to serous membrane. He did not try the loops of drainage-tube bound together by catgut nor Senn's bone-plates in approximating the two openings in the bowel. He found that a much greater percentage of deaths from anæmia and collapse occurred after gastro-enterostomy than after resection of the pylorus. This he explains as due to the fact that the gastro-enterostomies were necessarily prolonged and were not undertaken until an almost hopeless degree of stenosis of the pylorus and dilatation of the stomach existed. Several of his cases died from peritonitis set up by contact with the contents of the intestines, and he says that he much prefers that the bowel should be held by a competent assistant than by clamps or snares of iodoform cord. As to the depth of the stitches, he

says it is very difficult to lay down any general rules, except that by too deep stitching gangrene may possibly be set up around the wound, although he had not so far noticed it. He observes that most frequently there occurs a premature giving way of single stitches through the thin walls of the duodenum on the one side, and at the places from which many adhesions have been removed on the other, or where a stitch has been passed through a tough induration. The only safety lies in approximating healthy layers of serous membrane, whereby a firm and speedy adhesion prevents the escape of intestinal matter. The difficulty, however, lies in finding healthy serous membrane for this approximation after the induration or scars have been separated from their adhesions. He makes no difference in the technique of the resection, whether for carcinoma or for the scar of an ulcer. In cases of pyloric stenosis, where the induration and adhesions are widespread, a gastroenterostomy is a much safer operation, since by this means the tension is lessened and healthy serous surfaces may then be approximated. Billroth declares that in all cases of resection of the cæcum the results are most uncertain; no general rules as to the mode of operation can be laid down; and, no matter how the intestinal openings are stitched, there is always danger of occlusion of the bowel, or of the severance of the sutured ends. However, in all cases he strongly recommends that the abdominal wound shall not be stitched, but packed with iodoform gauze, in order to give easy exit to the fæcal matter should the junction of the bowels become detached. Resection of the colon is only possible in one place, namely, at the lower end of the sigmoid flexure. He performed it twice, but never will again. Lastly, in regard to resection of the rectum, in only 2 out of 7 cases was there a satisfactory result of control over the sphincters. This he attained by taking stronger stitches by threes, such as are made in suturing tendons or nerves, and then closing the gap by ordinary button sutures very closely taken. In conclusion, he says that in resections of other parts of the intestine there is, as a rule, some slight constriction, but generally no disturbance of function. As regards the advantage of these operations in cases of stenosis or fistula of the stomach or intestine there is no doubt; but in cases of carcinoma of the stomach or bowel the benefit by operation is problematical, albeit those patients who eventually succumb to the disease un-

doubtedly live much more comfortably than if they had not been operated upon.

A complete review of the subject of gastrectomy in carcinoma of the stomach is published by Jonnesco, of Paris. ¹⁰⁰ May 28 et seq.

PYLORUS.

Digital Exploration.—John W. Taylor, of Birmingham, ⁶ May 1, relates an instance in which digital exploration probably revealed a common cause of obstruction usually unrecognized. Having opened the stomach and inserted his finger to locate the pylorus, he could not find it for a considerable time, the stomach from within feeling like a closed sac. When discovered—over a sharply defined ridge of mucous membrane at the highest part of the stomach on the right side—the finger entered it easily, and could pass without difficulty down into the duodenum. There seemed to be but little, if any, increase of muscular structure in this situation, but the stomach and intestine were so acutely bent at the pylorus that the orifice was completely obscured until the stomach had been raised and a thorough search was made. The kinking of the gut—which only thorough distension of the stomach in the recumbent position seemed able to undo—must, he thinks, have been the cause of the gastric dilatation and the prolonged and persistent vomiting. He closed the wound in the stomach with a continuous Lembert suture, and the incision in the parietes with silk-worm gut. The patient recovered from the exploration without any untoward symptoms, nutrient suppositories being used exclusively for several days as food. From that time—over a year ago—the vomiting ceased, and the patient has had no return of it. In a few months after the operation she had increased two stones in weight.

Digital Dilatation.—J. W. Taylor ² Dec. 27, 70 read a paper on a case of digital dilatation of the pylorus. A woman, aged 43, had constant vomiting for several months, with great emaciation. The operation was performed in the manner advised by Loreta, and the obstruction was found to be of a valvular nature, and was rather due to flexion of the viscus than to narrowing of the pyloric orifice. The stomach wound was closed with continuous silk Lembert suture. The patient made an uninterrupted recovery, and had no return of symptoms. Another successful case is reported by Oberst, of Halle. ³⁴ Apr. 7

In a case of stricture following hydrochloric-acid poisoning, W. Hale White and W. A. Lane² performed a modified Loreta operation. Lane, having washed out the stomach and left the tube in as a guide, made an incision through the right rectus muscle and exposed the stomach, which was found to be a little dilated and much hypertrophied. The pylorus and the stomach close to it formed a firm, hard mass, not presenting any sign of malignant growth; it was so firm that it was thought it would be impossible to dilate the pylorus rapidly, and so the stomach-wall was attached to the edges of the abdominal wound, and the patient was fed with nutrient enemata for forty-eight hours, at the end of which time the stomach was opened, and it was found that the pylorus would only admit a No. 4 catheter. Through this the patient was fed every two hours for three days; he seemed to be doing well, but he died suddenly seventy-six hours after the stomach had been opened. The necropsy showed no cause for death; there was no peritonitis, no pulmonary embolism, nor was there any ulceration of the stomach to account for the pyloric obstruction. The cardiac end of the stomach was normal. In the discussion which followed the reading of the paper, Jessett advocated the operation of gastro-enterostomy with decalcified bone-plates, as introduced by Senn for the treatment of such a case, and remarked that Loreta's method of treatment by dilatation of the pylorus was almost certainly followed by subsequent contraction. Treves objected to the statement that contraction recurred after Loreta's operation. He mentioned 2 cases, upon 1 of which he had himself operated, in neither of which had symptoms of contraction returned, although two years had elapsed since the operation. In such a case as that reported he should advocate the treatment actually pursued rather than that by gastro-enterostomy. He was of the opinion that Loreta himself endeavored to dilate the pylorus to an unnecessary extent by introducing "three, or even four fingers," inasmuch as the lumen of the normal pylorus was about the size of a sixpenny piece. As to the difficulty of finding the pylorus, he remarked that in a case of his own, in spite of every conceivable procedure, during a search of more than half an hour he was unable to discover the pylorus. That patient's condition, nevertheless, subsequently improved immensely, so that she was able to go home, and remained free from severe symptoms for nine months. This led him to

remark upon the curiously beneficial effects that sometimes followed the mere opening of the abdomen, as to which he cited several examples.

An unsuccessful case of digital dilatation was reported by E. G. Cutter and M. H. Richardson, of Boston. ⁹⁹_{Dec. 18, '90} The operation was performed by Cabot, who, on attempting to increase the orifice to a diameter greater than that of two fingers, met a very firm, constricting band, which made a deep furrow in the dilating fingers. The condition of extreme emaciation into which the patient had fallen from prolonged malnutrition was probably the indirect cause of the fatal termination, which occurred five days after the operation. Autopsy was not allowed.

Surgery of Pylorus.—N. Senn, of Chicago, ¹_{Nov. 31} read a paper on "The Surgical Treatment of Pyloric Stenosis" before the New York State Medical Association, dividing his topic into (1) the operative treatment of cicatricial stenosis of the pylorus; (2) the operative treatment of carcinoma of the pylorus. Cicatricial stenosis of the orifice of the pylorus of the stomach frequently follows ulceration or traumatism in this location. The usual clinical symptoms were developed, and were first due to the obstruction to the passage of the food, and later to the compensatory hypertrophy and dilatation of the walls of the stomach. He then gave the history of 15 cases where he had operated for the relief of pyloric stenosis, and reached the following conclusions: (1) pyloroplasty, as devised by Heineke-Mikulicz, is the safest and most efficient operation for cicatricial stenosis of the pylorus; (2) pylorotomy in the treatment of carcinoma of the pylorus is a justifiable procedure when the disease is limited to the organ primarily affected, and when the patient's general health furnishes no contra-indication. (3) gastro-enterostomy by the aid of large, moist, perforated plates of decalcified bone, should be resorted to in the treatment of malignant stenosis of the pylorus as soon as a positive diagnosis can be made and a radical operation is contra-indicated.

Pyloroplasty.—A successful pyloroplasty is reported by F. J. Groner, of Grand Rapids, Mich. ¹⁸⁵_{Mar.} Alluding to the operations of Billroth and Wölfler, he says that they made their incisions almost transverse, and most other surgeons have followed their example. It is evident that the greatest space for manipulation

will be secured by an opening made in the line of the long axis of the stomach, and the pylorus ought to be very near the middle of this opening (Greig Smith). The direction of the incision matters little if sufficient room is provided for manipulation. In the case reported by Groner, Senn, who did the operation, opened the abdomen by an incision, six inches in length, in the linea alba, beginning over the stomach and extending toward the umbilicus. This gave abundance of room, although the depth of adipose tissue on the abdomen at the line of incision was three inches. It was necessary to allow some of the intestines to escape from the wound, in order to bring the pyloric portion of the stomach into it. These were protected by towels wrung out of warm water.

The pyloric portion of the stomach was simply a hard, fibrous cord, one-quarter of an inch in diameter. The operation was performed by opening the stomach at the beginning of the constriction, passing a small grooved director through the pylorus, and dividing the part above the director with a scalpel. This longitudinal incision, which passed from stomach to duodenum, and was about three-quarters of an inch in length, was sutured transversely with a Czerny-Lambert suture, the stomach and intestines returned to their proper position, and the abdominal wound closed after the usual manner. The operation in this case was a trifle tedious on account of the depth of fat. Groner records this as the fifth pyloroplasty up to 1891. The first operation was by Heinecke, in 1886; second (fatal) by Mikulicz, in 1887; third by Bardeleben, in 1888; fourth by Mikulicz, in 1888; fifth by Senn, in 1889. One death in 5 cases; A death-rate of 20 per cent. Postempski, of Rome,^{580 Feb. 2} refers to a case in which he performed pyloroplasty in a very marked case of stenosis complicated with an ulcer. A V-shaped incision, including the ulcer and extending transversely, proved completely successful.

Pylorectomy.—Klemperer,^{22 June 17} raised a discussion on the propriety of pyloric resection by giving a history of one of Köhler's cases, which he considered proved that the operation prevented enlargement of the stomach. He referred to 3 cases where the operation had been performed: in the first it was a perfect success, but six months later the patient died of phthisis pulmonum; the second died shortly after operation. The third was a young woman who had been received into hospital with a pyloric stric-

ture, which had been caused by her swallowing an alkaline irritant. When she was admitted the stricture was almost complete, and the patient in a weak, emaciated, and miserable condition. The operation was performed with very mediocre success, but six weeks later the patient returned with every appearance of health and vigor. From this, he concludes that the success of Heineke-Mikulicz's operation is not realized for some time after, although it is the most satisfactory in the end.

Combined Pylorectomy and Gastro-Enterostomy.—W. T. Bull, of New York, ¹_{Jan. 10} related before the New York Academy of Medicine the histories and the details of the operations in 3 cases of cancer of the stomach. He thought that the operation of pylorectomy had been simplified by the introduction of Senn's plates, and that the mortality would be much diminished. Another departure from the typical resection was the combination of pylorectomy with gastro-enterostomy, the cut edges of the stomach and duodenum being shut off so as to form a blind *cul-de-sac*, and the anastomosis being made between the stomach and the jejunum. This had been the method employed by the speaker in his 3 cases. In the preparatory treatment the stomach-pump had been employed after the patients were under the anæsthetic. This the author thought a more effective way of emptying the stomach than the old method of several washings out previous to the anæsthetic. The median incision had proved the most satisfactory, and was to be preferred to any other. He used no clamps on the stomach or duodenum to prevent escape of contents. The fingers of an assistant he considered more satisfactory, especially if, by the aid of hooks or loops of silk, the divided ends of the viscera were kept elevated in a vertical position. A plug of iodoform gauze was introduced into the duodenal opening and a flat sponge into the stomach. There was but slight bleeding from the stomach or intestinal wall, and that which followed the incision for the anastomotic opening was effectually controlled when the catgut rings were approximated. The loop of jejunum was shut off with strips of iodoform gauze while the anastomosis was being made. The continuous catgut suture through the mucous membrane, reinforced by interrupted sutures, was used to close the cut edges of the stomach and duodenum. In using the rings, the author always added to the silk sutures which held them in apposition a line of

continuous suture, with an isolated suture where he thought it necessary. He looked upon the rings not as an absolutely sure means of uniting serous surfaces, but as a most convenient adjunct to a carefully applied peritoneal suture. In all of his cases the gastro-enterostomy had been perfect in point of accurate and secure apposition. One of the patients operated upon by the speaker is now alive, and at the last hearing was in good health. He thought that the fatal result in the 2 other cases could be traced to faults in the technique; in 1 case at least there was no doubt of this, as the autopsy showed that a sponge had been, unfortunately, left in the stomach.

Statistics showed that out of some 1300 cases of cancer of this region one-half had involved the pylorus. Half of these again were uncomplicated by any involvement of the glands. Therefore, half the cases of pyloric cancer were really amenable to treatment by operation. He believed that death, in these cases, often took place from the effects of the mere mechanical obstruction long before the disease had exhausted the patient. The hydrochloric-acid test and other means now at one's disposal for careful and accurate diagnosis, in these cases, should render an early operation possible, and then, with perfected technique, he thought that the operation of pylorectomy might be raised from its present position to that of a life-saving and life-prolonging procedure.

F. B. Jessett, of Brompton, England,²²_{Nov. 18} publishes observations on and a successful case of combined pylorectomy and gastro-enterostomy. Two cases—operations of the same kind—had been performed in England previously, 1 by Lawson (not reported), mentioned by F. Nicholson,⁶_{Nov. 7} and the other by J. Greig Smith,⁶_{Oct. 24} both, however, terminating fatally. Jessett observed that all the cases operated upon in England by the method suggested by Billroth died within twenty-four hours of the operation,—this is evidently erroneous (see Robson,⁶_{p. 1128}),—and it cannot be doubted that the cause of death was shock. In the cases reported by Bull, 1 died of faulty suturing. Billroth's and Tuholski's cases of the combined operation also died from the same cause. In Bull's successful case he occupied three hours in the operation, devoting one hour to ligaturing the omentum. Rawdon, in his case of successful pylorectomy, ligatured the omentum in a similar manner to the pedicle of an ovarian tumor, and this course was

adopted by Jessett in the case reported. It is thus demonstrated by these 2 cases, in which this plan of dealing with the omental attachment of the pylorus was adopted, that it is a needless waste of time to attempt to ligature it in small sections.

The 5 cases that died after the combined operation of pylor-ectomy and gastro-enterostomy (leaving out Bull's third case, which died from a surgical disaster, which may occur to any one) all succumbed to faulty suturing. It behooves the surgeon, therefore, to be most careful in this respect; and Jessett draws attention to the form of suture adopted by him in his case, viz., the quilt suture, as suggested by Halstead. By means of this suture a wide and strong surface of peritoneum and muscular coat is insured, which is not at all likely to tear out. In using Lembert sutures the surgeon will find, to his chagrin, that, in pulling them together to tie, if the intestinal wall is at all soft, or there is much tension, they are apt to tear the coats of the gut, and thus cause a faulty suture, from whence future trouble may be feared. With the quilt suture he has never experienced this trouble; moreover, not nearly so many sutures are necessary as when adopting the Lembert suture. It is most important, too, that the surgeon should pass his needle well down through the muscular coat into the submucosa. It is often argued, against this, that there is fear of piercing the mucous coat. If, however, the surgeon will pinch up the coats of the stomach or intestine between his thumb and finger, he will feel the mucous coat slip away from him; he may then with safety pierce and include in his suture all the tissues he has pinched up, and this will include the submucous coat. In tying the sutures care must be taken not to ligate them too tightly, as sloughing may occur if this is done. In all cases of suturing the divided end of the stomach or intestine a first continuous suture should be introduced, passing diagonally through all the coats of the viscus, as described in the case reported. He reaches the following conclusions: 1. It will be obvious that the pylorus may be excised with safety in favorable cases; but the surgeon should be careful not to attempt its removal, without it is quite free from adhesion to neighboring important organs. 2. In cases reduced by disease, as patients suffering from pyloric obstruction invariably are, the operation that can be performed in the shortest time must be the best, provided it can be

performed with equal precision as the more lengthy operation. 3. The attempt to suture the divided ends of the stomach and duodenum by means of sutures should never be made. In favorable cases, where there is but little traction upon the divided ends, these can be united by means of approximation discs. 4. In all cases where the pylorus can be excised without interfering with neighboring important organs it may be removed by adopting the combined operation of gastro-enterostomy with pylorectomy. In cases where excision of the pylorus is inadmissible gastro-enterostomy should be performed. 5. Great importance must be laid upon the suturing of the divided ends of the stomach and intestine, and the only safe suture he thinks is the quilt or square suture adopted by Halstead. In each case which died from the results of the operation, the failure was found to arise from faulty suturing. Lembert sutures are apt to cut through, and should not be relied upon. 6. The omental attachment of the pylorus should be tied *en masse* by transfiguring and ligaturing in the same manner as an ovarian pedicle. 7. Gastro-enterostomy should be performed by means of decalcified bone-plates, and, for the sake of security, four or five quilt sutures should be placed around the upper edge and the two ends of the plates. 8. The jejunum should be caught up as near to its origin as possible and a loop applied to the front of the stomach, so that there shall be no traction upon it; at the same time it is important not to allow too much slack on the proximal side of the junction. 9. On no account is it permissible to catch up the first loop of the intestine which presents itself, as by so doing, although the operation may be successful, the surgeon may find, to his chagrin, that his patient gradually loses flesh and dies in the course of a few weeks of *marasmus*. At the post-mortem examination it may be found that the loop of intestine secured to the stomach is only a short distance from the ileo-cæcal valve. 10. The opening into the stomach and intestine should be at least one and one-half inches long, and, should the mucous membrane protrude, it should be cut away. By adopting this course, he thinks all fear of closure of the opening will be prevented. 11. The patient should be fed by mouth early,—in fact, the same day; warm water may be taken, and the following day peptonized milk, in small and repeated doses. 12. The patient should on no account be allowed out of bed for at least ten days to a fortnight.

A successful pylorotomy in a case of pyloric obstruction and dilatation of the stomach is reported by A. McCormick, of Sydney, Australia.²⁸⁷ A good review of the subject of surgical intervention in stenosis of the pylorus is given by Jalaquier, of Paris.³⁶³

Gastro-Enterostomy.—Robert F. Weir, ¹_{Jan. 10}, presented before the New York Academy of Medicine a patient, aged 41, upon whom he had performed, about a year ago, a gastro-enterostomy for the relief of a supposed fibrous stricture of the pylorus. The progress had been in every way satisfactory. The patient had made a rapid recovery, and had continued in fairly good health up to the present time. During the past two months there had been a return of the vomiting. This, the author thought, might be explained in one of several ways. It was to be noticed that the wound in the abdominal parietes had yielded somewhat and allowed a hernial protrusion upon coughing or other expulsive effort, and this had occurred in spite of the greatest care being taken in the closure of the wound. It was at first supposed that the traction of the protruding intestine through the abdominal defect might be sufficient to increase the angle, temporarily at least, at which the intestine was attached to the lower wall of the stomach, but, on carefully applying a truss or pad, no special improvement had followed. The next important question to decide was whether the plan followed at the time of the operation was not at fault. At the time of operation, after the abdominal cavity had been opened, the hand was carried down to the vertebral column, feeling for the head of the pancreas, and then passed to the left of the median line, falling upon a loop of intestine, which was seized; if traction made upon it had met with resistance it would have indicated that one was pulling upon a fixed point,—the duodenum. But this was not the case, and, after one or two repetitions of the effort to grasp the upper end of the jejunum in this way, a loop of small intestine, situated nearest to the stomach, was caught hold of and brought out, incised, and sewed to the wall of the stomach. After reviewing the possibilities which might have led up to the return of some of the pre-existing symptoms, Weir said that perhaps the opening made might have contracted so as to no longer permit of the passage of food from the stomach to the intestines. Abbe and other surgeons who had made intestinal anastomoses, using plates or rings, had in many instances found this contraction

to a marked degree. This result was improbable in his case, as he had made very large openings. Careful experiments had shown that the man digested his food completely, and that the vomited material was merely mucus. The patient was under treatment by lavage for dilatation, and was improving by this plan. The speaker then gave a critical analysis of the comparative mortality from the operations of gastro-enterostomy and resection of the pylorus. He thought the latter operation had been performed a sufficient number of times and had been attended as yet by such fearful mortality, and had been of such little use in prolonging lives not directly lost by the operation, that it might be relegated to a place among the experimental procedures. He then gave his opinion as to the relative merits of the contrivances for keeping the peritoneal surfaces apposed and for expediting the operation. Of Senn's plates he said that the openings were too small. To get this defect remedied seemed likely to be a tedious matter. Of Abbe's rings he said that, unless they were made with strict adherence to the plan laid down by the inventor, trouble was likely to ensue by their twisting upon themselves, in which case they would be likely to cause a solution of continuity and disastrous leakage.

A case of gastro-enterostomy followed by recurrence of symptoms was reported by F. C. Larkin, of London, ⁶July 11, ⁶Sept. 19, ⁶Oct. 2 who thought it most probably due to one of two causes: (1) extension of the malignant growth around and over the orifice; (2) closure by cicatricial contraction. He cites Stansfield's case in support of his opinion. F. B. Jessett, of Brompton, ⁶Sept. 26, ⁶Oct. 10 suggests that there may be a third cause for the recurrence of symptoms, viz., constriction of the jejunum at the aperture in the transverse mesocolon or great omentum, through which the intestine was drawn.

One successful case is reported by Brookhouse and Owen Taylor, of Nottingham ⁶Mar. 22; 2 by A. C. L. Ramsey, of St. Cloud, Minn. ¹⁰⁵May 16; 1 by J. C. Renton, of Glasgow ²¹³Apr.; 1 by A. W. Mayo Robson ⁶May 23; 1 by F. B. Jessett, of Brompton ⁶Oct. 24; 1 by Rotter, of Berlin. ⁶⁹Oct. 1 Unsuccessful cases were reported by J. Kilner Clarke, of Huddersfield, England ⁶Dec. 6, '90; Carl Koch, of Nürnberg, ³⁴Dec. 9, '90 and Sainsbury, of London, ⁶Jan. 3, whose case was found to be one of gastric ulcer simulating cancer of the pylorus. An excellent review of the subject of gastro-enterostomy with rawhide and segmented rubber plates is published by F. B. Robinson, of Toledo, Ohio. ⁹Mar. 14

PANCREAS.

Cysts.—Jules Boeckel, of Strasburg, ¹⁰⁸_{Ann. 1, 9, 11, 12, 70, 1 100} published an elaborate study of cysts of the pancreas. He reviews the difficulties of diagnosis, established *prima facie* only six times in 30 cases, and that only after exploratory puncture in some cases, and most frequently only after laparotomy, and cites the errors committed, confusion with ovarian cysts, etc.

As to the diagnosis of the nature of the tumor, he outlines the different views expressed in regard to exploratory puncture, of its usefulness according to Küster, Annandale, and Riegner, and its uselessness in some cases according to Fenger, Kulenkampf, Senn, Koetz, and Hagenbach. He studies the differential diagnosis, as obtained from examination of pancreatic fluid and of its characteristic properties. To locate the tumor, he cites the methods of Léon Labbé and Tillaux as to its being parietal or intra-visceral, and that of Tillaux as to its intra- or retro-peritoneal location. To determine the character of retro-peritoneal tumors, he describes the hydro-aërial sound, which le Dentu considers as a characteristic of cysts of the pancreas, and its mode of production. He also cites Minkowsky's and Naunyn's method of inflating the stomach as an aid to differential diagnosis. Prognosis is next considered. As to treatment, Boeckel outlines the ideas formerly entertained as to the surgical treatment of pancreatic cysts, and their complete transformation within the last few years. He cites Tillaux, for instance, who, in the 1877 issue of his work, ²¹⁶⁰_{p. 611} states that, "of all the viscera contained in the abdominal cavity, that of least interest to the surgeon is the pancreas, owing to its deep situation," and devotes eleven lines to the consideration of the organ; whereas, in 1888, in his work on surgery, ²¹⁶¹ he devotes an entire chapter to the same subject. As to the results of surgical procedures, Boeckel places the mortality at $21\frac{8}{10}$ per cent. He then reviews the procedures. He considers simple puncture as ineffectual and dangerous, and thinks it should not be resorted to. Récamier's operation he also deprecates, owing to its dangers. Statistical charts end the work, which is truly an admirable one, and thoroughly entitled to the substantial recognition it received in Paris.

Two cases were reported,—one by Fenger, ¹⁰²⁷_{Ann.} the other by Steele,—in both of which the diagnosis had been made prior to operation. In that year I saw a case in the London Hospital in

which a cyst containing $1\frac{1}{2}$ gallons was successfully treated by tapping and evacuation by Treves. Of the 16 cases, which were all he had been able to collect up to that time, not one had been correctly diagnosed in advance. His own operation was undertaken for a supposed sarcomatous tumor.

Albert ¹¹³_{No. 43}; ⁹_{Nov. 21} recently presented to the Royal Society of Physicians of Vienna a man upon whom seventeen months previously he had operated for a tumor of the pancreas. Clinically, there was a tumor, as large as the uterus at the end of pregnancy, situated in the epigastrium, and sending a process into the pelvis, the percussion dullness of which posteriorly was indistinguishable from that of the liver, and which was taken for an echinococcus of the liver. As, however, the stomach could be detected anteriorly to the tumor, a diagnosis of tumor of the pancreas was made and operation advised. When the abdomen was opened by a median incision and the transversalis fascia divided, no translucent membrane was found; so that, to enter the free peritoneal cavity, a second incision was made in the right hypogastric region, the tumor reached and punctured. After the cyst was evacuated, it was drawn forward, and a portion that appeared to protrude from the foramen of Winslow was removed. It did not seem advisable to remove the entire tumor, on account of the high mortality (50 per cent.) of such operations. For some time after the operation a saccharifying and peptonizing fluid was discharged through the wound, progressively diminishing in quantity. The case was the third of tumor of the pancreas operated on by Albert.

In a case operated by D. Hayes Agnew ¹¹²_{No. 7}, the tumor was very large, centrally located, movable in any direction except downward, tense, and elastic. The woman suffered constant pain, and only obtained relief by the daily use of morphine. For the last six months she had spells of severe diarrhœa. A peculiar feature connected with the enlargement was its constant alteration in form and resistance, some days being spherical and hard, and on other days ovoidal and flaccid,—characters which possessed some value from a diagnostic point of view as indicating a cyst the fluid contents of which found a place of escape when the walls became over-distended, and had, no doubt, much to do with the diarrhœa that frequently occurred. The resonance over the abdominal walls

indicated that the cyst was probably deeply located behind the hollow viscera.

The operation consisted in opening the abdominal cavity through the linea alba, dividing the gastro-colic omentum, and exposing the wall of the cyst. The latter being tapped, between 2 and 3 gallons of a light-brown fluid were removed. Exploration with the finger showed that the cyst was attached high up, behind the stomach, to the pancreas, and had contracted adhesions so general that an attempt made to detach these connections was soon abandoned. After thoroughly washing out the interior of the sac with a solution of boric acid, its opening was stitched on the external wound of the abdominal parietes, and the whole dressed as after an ordinary laparotomy.

The subsequent discharge from the cyst was never large in amount, and daily became less until after the lapse of two weeks, when no discharge whatever occurred. The woman was sent home, after four weeks, perfectly well. Over a year had elapsed, and, as no return has been reported, the cure was believed by Agnew to be a permanent one.

In this case the stomach was spread out over the wall of the cyst, so that it seemed itself to be the parietes of the tumor. An inexperienced or hasty operator might readily have tapped it. It was partially adherent, but could be displaced sufficiently to expose a sufficient surface of the cyst-wall. Three or four years have now elapsed, and I have recently heard from the patient, who was entirely well.

M. H. Richardson, of Boston,⁹⁹ successfully operated in the case of a man aged 50. After exposing the cyst, a very small aspirating needle was introduced, from which a fine stream of clear, straw-colored fluid spurted at least a foot into the air. The tumor was emptied, as far as possible, through the needle. The opening was then enlarged and a glass drainage-tube inserted. No stone nor other foreign body could be detected in the cyst. The edges of the opening were brought up and stitched to the abdominal wall. The edges of the wound were brought together with wire and superficial silk sutures. Siphonage was so arranged as to prevent any leakage of fluid. A dry dressing was applied. The patient rallied immediately from the operation, and made an uneventful recovery. There was a good deal of discharge

from the cyst, which was kept as far as possible from the edges of the wound by means of siphonage and a rubber dam. The fluid was examined, and found to have the characteristics of pancreatic fluid. He was discharged, with a small sinus.

This case was interesting on account of the difficulties in the way of diagnosis. It was, however, greatly facilitated by the hydro-aërial test, which is as follows: After catharsis and rectal washing by enemata, the rectum is filled with water; percussion then shows the colon to be in front of and over the tumor. The stomach is then filled with air, and it also appears in front of the tumor. It illustrates again the value of exploratory operations in doubtful cases. As to the advisability of aspirating such tumors, Richardson thinks that the fact that the cyst was so tense as to throw a stream of fluid a considerable distance through the needle shows that aspiration, even with a small needle, through the abdominal wall, is a dangerous one if there is anything septic in the fluid. If the cyst had been aspirated beforehand, there would probably have been a large escape of the fluid into the abdominal cavity. The method adopted for drainage was perfectly successful, and obviated the dangers of the use of the aspirating needle. The case was studied some weeks before entrance into the hospital and two weeks or more after admission, and an exploratory incision was advised only after the most careful consideration.

Santi Flavio, of Turin, ⁵⁰⁵_{No. 11}, ⁹⁶_{Dec.} calls attention to a symptom as yet unobserved in carcinoma of the pancreas, namely, the presence of chylous ascites. Among 3233 cases treated from 1883 to 1889 in the General Hospital of San Giovanni, in Turin, Italy, there were only 2 cases of carcinoma of the pancreas. Both of these were accompanied by chylous ascites; this special form was not observed in any other case. Hence, the writer does not regard it as a mere coincidence, but would explain its presence by the contiguity of the head of the pancreas with the thoracic duct, which passes behind this gland and along the vertebral column. An abnormal development of the pancreas would cause it to press upon the thoracic duct, and consequently lead to its rupture and the passage of chyle into the peritoneal cavity. Rupture is not a necessary consequence, as extravasation might also take place by diapedesis.

It would seem strange that a symptom so constant in these

2 cases should have been overlooked as yet by all observers. The writer is quite certain that it must have been present in many cases of cancer of the pancreas, and yet passed unobserved. Ruggi⁵³⁷_{Jan. 70} reports a case in which he noted the presence of ascites, but he speaks of this as of minor importance. In such cases the ascitic fluid might be largely serous and require the microscope to reveal the fatty globules.

G. Newton Pitt and W. H. A. Jacobson⁶_{June 12} reported a case successfully treated by laparotomy and drainage. The case had originated from a kick in the abdomen. A. Pearce Gould,⁶_{Aug. 9} reported 2 successful cases, both in women. In a case described by Hartmann, of Paris,⁸_{Apr. 11} the patient, a woman, lived but a few months after the operation. Autopsy demonstrated that the cyst was epitheliomatous. The liver also showed evidences of malignant involvement.

Carcinoma.—In an article on the diagnosis of carcinoma of the pancreas, Musinecci, of Naples, Italy,⁵¹⁵_{Nov. 81, 82, 83, 90; Dec. 96} concludes as follows: 1. The diagnosis of carcinoma of the pancreas is difficult in the majority of cases, as it is most easily confounded with neoplasms of other organs. 2. Diagnosis by exclusion is the best method of diagnosing disease of the pancreas in general and carcinoma in particular. 3. Icterus is present from the beginning of the disease. The presence of a tumor whose site corresponds to that of the pancreas and the finding of fat in the fæces and sugar in the urine are facts of great value, in the majority of cases, in making a diagnosis. 4. The presence of these signs, although of great diagnostic value, does not enable one to determine the primary origin of the neoplasm, as the transmission of cancerous nodules from one organ to another is the rule, and we have no means of knowing whether the pancreas, liver, or stomach was primarily affected.

LIVER.

Terrillon, of Paris,⁶⁷_{Feb. 16},²²_{Jan. 14} reports several operations on the liver and gall-bladder. During the last five years he was called on 6 times to operate on the biliary vessels, and twice he explored the liver for illy characterized affections. The first patient had a tumor which seemed very like a distended gall-bladder. It was not adherent, and when opened a calculus was found in the cavity. Terrillon created a fistula, which gave exit to the bile during a fort-

night, and in about two months it closed spontaneously. The second patient, a woman aged 28, was suddenly seized with symptoms of local peritonitis in the hepatic region. Subsequently a large, fluctuating tumor was observed above the umbilicus. Tapping gave exit to half a pint of greenish liquid, and when the tumor was opened a great number of calcareous bodies was found incrusting on its walls. Terrillon did not think fit to remove the gall-bladder, limiting himself to a fistula, and at the end of six months the patient fully recovered. Another case was that of a woman, aged 57, who had suffered frequently from hepatic colic and jaundice. A hard and painful tumor was found at the free edge of the liver. Laparotomy was performed, and the gall-bladder was discovered adherent to the organ, and its cavity packed with small calculi,—about 200 were removed. The same treatment was followed as in the other cases, and the woman did well. Of the remaining cases, 1 died, after operation, from prostration.

Abscess.—Demmler ⁷³ _{May 2}, ¹¹² _{Aug.} advocates early operation in abscess of the liver, as advised by Little, not waiting until the organ is partially destroyed or profoundly altered and the abscess begins to point externally. Exploratory punctures are strongly advised. Careful exploration by digital pressure should be made of each intercostal space, and the thorax carefully viewed for any deviation from its normal surface. There are two kinds of hepatic abscesses: one, which is a degeneration of the organ, starting from some intestinal trouble; and the other, which is a primary inflammation of the gland, arising from various causes,—disturbance of its functions, etc. In many cases dysentery has been lacking, the diarrhœa being due to the emptying into the intestine of bile altered by the products of hepatic inflammation. It is in these latter cases that Little's method is applicable, because the foci are generally isolated, and the remainder of the organ is not too profoundly affected to be insusceptible of cure. He reports 5 cases, with 1 death.

Our corresponding editor in Mexico, Semeleder, reports a case of abscess of the liver cured by drainage in nine days by Francisco Bello. ¹⁰²⁴ _{v.1, p.146} In discussing this case, the latter divides hepatic abscesses into the two varieties above described. He believes the latter the more frequent cause, and looks upon the concurrent diarrhœa as symptomatic and not causative. He quotes 5 cases reported by Demmler to corroborate his theory that malarial infection may give

rise to hepatic abscess. The author has seen cases which seem to support this theory.

He reports a second case of hepatic abscess in a man of 28 years, with no positive data as to cause, which was treated by puncture. The abscess opened later into the pleural cavity; 835 grammes (28 ounces) of pus were drawn off. The pus-cavity was injected with iodine, and, after a few minutes, the liquid was allowed to flow out. The patient was well in twenty-four days.

In a paper on the treatment of abscess of the liver, Peyrot, of Paris,²² said that the direct method of opening hepatic abscess according to Stromeyer-Little encountered for a long time serious objections. It was difficult to conceive how the flow of pus into the peritoneal cavity was not followed by peritonitis, and no one dreamed of the reason why such a hardy method could be innocuous. The following case illustrated fully this fact: a fitter, aged 28, entered the hospital for severe pain in the abdomen, but especially in the hepatic region, accompanied with fever. His general condition was lead, complexion earthy, and wasting well marked. This man had lived seven years in New Caledonia, where he had repeated attacks of dysentery. Examination revealed great tenderness of the liver, which was greatly enlarged, and an abscess was suspected. A trocar was plunged in, giving exit to a notable quantity of pus, but the patient experienced but little relief. Peyrot decided on cutting boldly down on the abscess without heeding the precautions usually recommended for guaranteeing the peritoneum. He made an incision right down to the seat of matter, about two inches in length, and about 1½ quarts (1½ litres) of pus flowed away. The cavity was washed out antiseptically, and drainage applied. The man made an excellent recovery, although some of the pus must have got into the peritoneum. Kartulis, in 1887, gave an explanation of this curious fact by affirming that the pus of hepatic abscesses, following the dysentery of hot countries, contained no micro-organisms. Périer said that he opened abscesses of the liver, but he sutured the organ to the abdominal incision before opening it, as the liver always slipped up considerably, and consequently the two openings did not correspond, which prevented proper drainage. Chauvel operated four times in such cases, where the liver was not adherent; he never fixed the gland, and his patients all recovered, nevertheless.

It seems more probable that in these cases there were unnoticed parietal adhesions. In Peyrot's case the degree of enlargement showed that enough time had elapsed for the formation of limiting adhesions, and his assumption that some of the pus "must" have got into the peritoneum appears unwarranted.

Hydatids.—Fogliani, of Modena, ⁵⁰⁵_{Jan. 21}, ²_{Feb. 7}, reports a successful case of resection of the liver for hydatids from the practice of Tansini. The patient, a woman aged 25, was admitted on November 26, 1890, suffering from a tumor of the epigastric region as large as a foetal head, with shooting pains in the abdomen and occasional vomiting. She had first noticed the swelling some three years before. Her health in other respects was excellent. On December 8th laparotomy was performed by Tansini. The tumor was firmly adherent to the great omentum, and in separating it therefrom many ligatures had to be used. On drawing forward the mass, so as to get at the deeper part of it, the left lobe of the liver was brought out, and it was seen that the tumor was completely buried in its substance. Tansini, seeing that the tumor was a hydatid cyst, proceeded to dissect it out from the liver-substance, commencing on the left side at some distance from the cyst, so as to avoid wounding its walls. Partly by enucleation and partly by careful incision of the liver-substance he succeeded in getting away the whole of the cyst. The hæmorrhage, which was considerable, was checked by ligature of the more important vessels and temporary plugging of the "vast hepatic wound," so as to stop the oozing from the cut surface. The wound in the liver was then carefully closed by two series of sutures of catgut (No. 0) and Lister's silk (No. 1), alternately, one passed on the convex and the other on the concave surface of the organ; in all, sixteen sutures were applied. The abdominal wound was closed by deep and superficial stitches. There was no rise of temperature, and on December 25th, seventeen days after the operation, the patient was discharged completely cured. In a case seen by Michaux, of Paris, ³_{Apr. 11}, the cyst involved the entire organ. Laparotomy with suture of the opening to the parietes brought about recovery.

J. C. Verco, of Adelaide, Australia, ²_{Aug. 29}, strongly advises and always practices the removal of all daughter-cysts and the mother-cyst at the time of incision; and for this reason, among others:

that where collapse of the walls of the hydatid cavity is possible, so as to allow apposition, the two surfaces will directly unite by a process analogous to the primary union of wounds. He has never seen a surgeon in South Australia leave the membranes in a hydatid cavity after having opened it by incision. Such a mode of procedure would excite no little wonder and comment there. In a large proportion of cases the mother-cyst, by protrusion at the wounds, not only invites removal, but absolutely insists on being allowed exit, and the difficulty would be to keep it in. He cannot see the advantage of allowing it to remain. The danger feared from removal is uncontrollable hæmorrhage. But in what way can it induce this? There is not the slightest organic connection between the hydatid membranes and the adventitious capsule which surrounds them. Their removal, therefore, cannot injure the capsule, nor their presence prevent hæmorrhage from it. A complete review of the subject of surgical treatment of hydatid cysts of the liver was published by P. Chéron, of Paris.¹⁷ As usual, the literature of the year contains a number of cases in which evacuation of the cyst was the only feature mentioned.

Tuberculosis.—Cale, of St. Louis,¹⁰⁹ presented an abscised portion of a liver supposed to be affected with tuberculosis, and taken from a boy aged 11 years. The case had begun two and a half years before with symptoms of ordinary typhoid fever. A swelling developed in the region of the right lobe of the liver. About six months later a small abscess formed just to the right of the gall-bladder, from which, after being opened, a discharge of fluid continued for a period of a year and ten months. An examination revealed the presence of a tumor, somewhat larger than a fist, on the under surface of the right lobe of the liver. It was found impossible, by external manipulation, to determine whether the tumor was of the right kidney or of the liver. The urine was normal. The probe, introduced into the fistulous tract, penetrated under the liver and toward the right. The diagnosis made was tumor of the liver, either malignant and degenerating or tuberculous. An external incision was made parallel to the twelfth rib, beginning at the external border of the obliquus externus and extending down to the quadratus lumborum muscle, cutting the fibres of the latter. The tumor involved about one-third of the right lobe; this was removed by the scissors, blunt instruments, and fingers;

a portion of indurated tissue at the base, which could not be removed, was curetted. The temperature before the operation was 101° F. (38.3° C.) constantly; since the operation it has been normal. The boy's parents had died of some lung trouble. If the case were one of tuberculous tumor of the liver, Cale considers it as the first for which an operation has ever been done. Pending microscopical examination discussion of the case was postponed.

Abrams, of San Francisco, ⁷⁷_{Sept.} said that in examining a case of sarcoma of the liver by parenchymatous aspiration he had succeeded in obtaining the distinctive cells. He also considered it useful to determine the presence of the bacillus in tuberculous consolidations.

GALL-BLADDER.

Cholelithotriety.—A. W. Mayo Robson ⁹⁰_{Oct.} wrote a valuable paper on cholelithotriety, first suggested and performed by Lawson Tait as a sequel to cholecystotomy. The method was criticised adversely by Delagénère, who advocated cholecystenterostomy in place of crushing, which he believes to be a dangerous operation, since the gall-stones have to be crushed through the walls of the duct. Robson having performed cholecystenterostomy successfully, he would again resort to it if he found an insuperable obstruction in the common duct, but he should not think of doing it if he were able to crush or otherwise remove the obstruction. As used in the article, the term “cholelithotriety” (which holds a different position to ordinary lithotriety) means crushing of the stones through the walls of the canal in which they lie. This may be accomplished, in some cases, by means of the finger and thumb when the concretions are soft, or by means of padded forceps if the stones are too hard to yield to digital pressure, and should this fail the method of puncture with a fine, round needle may be employed, which will in some cases cause the stone to split up into smaller fragments. The needle-puncture need cause no anxiety, as when the needle is withdrawn the puncture immediately closes. When these manipulations have to be effected in the common duct, it will, as a rule, be necessary to make the parietal incision rather larger than the one usually employed for cholecystotomy; and should these means fail thoroughly to clear the ducts, or should the stone prove too hard to be crushed or diminished, the parts may be more fully exposed by means of large retractors or by

means of a vaginal speculum, and the ducts incised for the removal of the obstruction, sutures being applied to close the opening through which the stone has been withdrawn, as performed by Thornton. It goes without saying that great force is inadmissible, and that considerable judgment must be exercised as to how much force can safely be employed.

I have recently operated on a case for William Pepper, in which a stone impacted in a very thin common duct was made to crumble and disappear by means of pressure with padded forceps. The patient died some weeks later of exhaustion and cholemia, and the autopsy showed that no injury whatever had been done to the walls of the duct.

Cholecystotomy.—Roux ¹⁹⁷_{Oct. 70}; ²_{Nov. 15, 70} gives an account of 2 cases of cholecystotomy, both of which recovered. The gall-bladder was opened and the stones removed, after which its walls were sutured and it was replaced within the abdomen. He calls this “ideal cholecystotomy,” in contradistinction to natural cholecystotomy, in which the gall-bladder is sutured to the abdominal wall.

W. W. Seymour, of Troy, ⁵⁹_{Dec. 6, 70} gives an interesting personal experience with gall-stones, and reviews the operations for their relief. He considers cholecystotomy as the ideal operation, because it enables us to remove collections in the gall-bladder, the most common situation; at the same time it affords a channel for the bile to escape if there is any temporary obstruction, as inflammatory swelling or an overlooked stone in the common duct. If there are stones in the common duct, they can be removed by crushing, as done by Tait, or by excision and subsequent suture of the duct, as successfully done by Thornton. “Patients may live for years with no bile entering the intestine, so long as an exit is given to the bile by a fistula, which is a marked contrast to what the issue would be were a stone impacted in the common duct overlooked in a case of cholecystectomy. In this latter case one of two equally fatal conditions would result,—either slow poisoning from the retained bile, or rapidly fatal peritonitis from the forcing by retained bile of the ligatured cystic duct. In case of a re-accumulation in the gall-bladder (it must be remembered that gall-stones do not only form in the gall-bladder), very slight though the chances appear, a simple incision in the cicatrix of the adherent gall-bladder would give easy access to, and exit for, the

stones. The dragging of the adherent gall-bladder at first is somewhat inconvenient and unpleasant, but in my own case it did not make itself felt more than a few months, and this summer I have rowed, sparred, swam, and played lawn-tennis without the slightest inconvenience. The danger of a permanent fistula is very slight, as it is only when an obstruction in the common duct has been unrelieved that this can occur. If from an impacted stone time may be gained for its excision or crushing, and if the obstruction is insurmountable, we can still do a cholecystenterostomy, as has been successfully done by Greig Smith and Winiwarter, and thus divert the bile to the bowel and close the fistula. To suture the incised gall-bladder and drop it back exposes the patient during the first few days to the same danger as cholecystectomy, and its mortality has been enormous."

Seymour's conclusions are : 1. Epigastric pain, with tender liver-border, swollen gall-bladder, and clay-colored stools are the cardinal diagnostic points. Jaundice and shoulder pain are too infrequent to be of much value. 2. Medicines are of only temporary value in cases of gall-stones, as we can never tell whether we have large or small stones to deal with. 3. Early operations will cure with but a very small fatality, probably less than 5 per cent. 4. The excision of the gall-bladder should never be an operation of election. 5. Cholecystotomy satisfies all the requirements of the operation. 6. Recurrences are as yet unknown. 7. Medical consultations only wait for the autopsy to settle the diagnosis.

W. H. Bennett⁶ relates a recovery in a case of acute biliary colic in which cholecystotomy was performed while the patient was in an apparently moribund condition. A large number of cholecystotomies were reported during the year, several of the cases mentioned being complicated with marked empyema, 2 pints (1 litre) of pus in one of them being evacuated. When malignant disease did not intervene to interfere with a successful issue, the proportion of deaths in the cases reported is certainly extremely small. To illustrate to what degree this region will withstand operative procedures, W. Arbuthnot Lane, of London,⁶ describes a case of rupture of the gall-bladder in a boy who had been struck in the upper part of the abdomen, just above the umbilicus, by the pole of a van. A considerable quantity of bile escaped into the peritoneum, and it was only five weeks after

the injury that the operation was performed, when 3 gallons (12 litres) of fluid, very deeply stained with bile, were removed, complete recovery finally ensuing. "This fact alone," says Lane, "will give one much more courage in interfering with abnormal conditions of the gall-bladder and bile-ducts than formerly, and will completely remove the dread experienced of the imaginary risks which were involved by the escape of a considerable quantity of bile from the gall-bladder, or even from the common bile-duct. In the latter case it is of especial importance in the removal of gall-stones. I am informed by Pavy that when making experiments on the secretion of bile in dogs and rabbits he found no harm result from the escape of even a considerable quantity into the peritoneal cavity, and he had concluded that, as far as these animals were concerned, bile exercised no irritant action upon the peritoneum."

Cholecystectomy.—Adler, of Berlin, ²²_{Aug. 26} related the case of a man, aged 37, who had suffered for eighteen months from gall-stone colic. Recently he had had attacks almost daily, lasting two to three hours. Adler discovered in the continuation of the mammillary line a small, tolerably hard, and movable tumor, tender on pressure. After laying open the region of the gall-bladder by means of a T-incision, one could feel through the walls of the gall-bladder several hard lumps the size of cherries. The fundus was incised by means of the elevator, and two crumbly stones were removed. As in spite of this three others were felt, the gall-bladder was removed. A spot in the liver that bled freely was ligatured. The recovery was stormy,—violent vomiting and meteorism. Improvement on the third day. Removal of the stitches on the fourteenth day. Recovery in five weeks. The gall-bladder showed three cysts. The first was ruptured during the operation; the second and third were filled with a large quantity of cholesterin crystals. A yellow concretion the size of a hemp-seed was imbedded in the wall of the gall-bladder. The most striking feature was the numerous varix-like ramifications.

Three interesting cases of operations on the biliary passages are reported by Périer. ⁷⁰_{June 20}, ²⁶_{Aug.} The first was that of a young woman, 24 years of age, who perceived after her accouchement that she had a movable tumor below the liver, the puncture of which led to the discharge of serous fluid. A mesenteric cyst was

diagnosed. Laparotomy showed the existence of a distended gall-bladder, the neck of which was obstructed by a calculus. A provisional ligature was placed on the cystic duct and the bladder was removed. The wide end of the cystic canal was closed by catgut suture. The result was complete recovery. The second case was a woman, 36 years of age, who had suffered for two years from pains, which she regarded as of hepatic colic. She showed a round tumor corresponding to the site of the gall-bladder. Laparotomy exposed an inflammatory mass adherent to the liver, puncture of which emitted a thick, yellow, ropy fluid. No concretion could be discovered. The edges of the incision were stitched to the abdominal wall, and drainage employed. The patient recovered, but a fistula remained. The third was also a female, aged 60 years, who suffered for nearly a year from symptoms of dyspepsia distinctly referable to the region of the pylorus. In this region there could be felt a hard tumefaction, nodulated and painful. Périer formed the diagnosis of a biliary calculus, with inflammatory products, causing pressure upon the pylorus or duodenum. Laparotomy discovered an indurated mass, having the aspect of inflamed epiploön, behind which was the pylorus. On detaching adhesions a fluid containing concretions escaped. Three hundred and six calculi were met with; the bladder had disappeared by its fusion with neighboring organs. The opening of the cavity was fixed to the abdominal walls. The patient recovered.

Cases were reported by J. L. Dawson, of Charleston ⁹_{Dec. 6, '90}; E. Ricketts, of Cincinnati ⁶¹_{Dec. 6, '90}; F. Lange, of New York ¹_{Jan. 17}; W. F. Hutchinson and E. C. Gates, of Providence, ¹³⁸_{Aug.} and L. Matlakowski, ⁵²⁰_{Nov. 26, '90}—all successful. A review of the subject was published by Courvoisier, of Basle. ²¹⁴_{Sept. 1} E. Rose, of Berlin, ³⁰¹_{Jan.} raises his voice against cholecystectomy, which should not be resorted to, he says, except in cases of malignant or complete degeneration. It may be replaced by local treatment of the gall-bladder and measures calculated to restore the outflow of bile into the cystic duct. Another reason against the utility of extirpation, is the possibility that the occlusion of the cystic duct may be followed by dilatation of the biliary passages.

In operating upon a woman, 40 years old, with calcular obstruction of the cystic duct, Sprengel, of Dresden, ⁶⁹_{Sept. 3}, ⁹_{Nov. 21} mistook

the cystic duct for the common duct, and the common duct for the intestine. By expression the calculus was forced from the cystic into the common duct, and it was thought that the biliary passages were free. The symptoms continuing, however, the abdomen was again opened, and two calculi were found, one in the cystic duct and the other at the transverse fissure of the liver. On account of the former the gall-bladder was removed and the cystic duct was ligated; the second calculus was crushed. To overcome the obstruction in the common duct an artificial communication was established with the duodenum. Three months later the patient had recovered, and was free from symptoms.

OMENTUM.

Tumors.—B. E. Hadra, of Galveston,⁹⁸ writes a paper on the tumor-like conglomeration and the purely cicatricial tumor-like thickening of the omentum, the results of inflammatory processes. In his opinion the purpose of the omentum is not only to serve as a protective padding to the abdominal cavity against undue forces from without, but it has a much more important office,—that is, the protection of the peritoneal cavity against infection from a diseased point within. The slightest irritation anywhere on the peritoneal surface, parietal or visceral, causes the omentum to attach itself over the affected area, if accessible, and in this way to shut off the focus of infection from the remainder of the peritoneal cavity. Thus omental adhesions will be found whenever the surface of liver, stomach, gall-bladder, etc., becomes affected, or whenever virulent material enters through the Fallopian tubes, but obviously affections of the bowel-walls will offer the most frequent and direct occasion. It is not at all necessary that there should be macroscopical changes,—ulcers, abrasions, perforations, etc.; it will suffice that the bowel-wall be so altered as to allow pathogenic germs, or their derivatives, to penetrate or to percolate through them. As is well known, also in abdominal operations, the slightest traumatism, or the least infection, will cause omental adhesions. After such adhesions are established it only depends upon their size and compactness whether they will offer clinical features of a tumor or not. The inflammatory process will probably extend into more distant portions, and the consequence will be that folds which are farther away will adhere together, and thus increase

the size of the tumor. We will thus have a swelling of an acute origin which, Hadra thinks, ought to be placed on the list of abdominal tumors for differential diagnosis. Some consider such a tumor as a coprostasis in the cæcum; others as œdematous infiltration of the pericæcal areolar tissue. In investigating the further fate of such a tumor, we find the following possible outcomes: 1. The inflammation may subside, resorption of all abnormal products set in, and the omentum may detach itself. The tumor disappears. 2. The inflammation subsides, but the omental adhesions become firm and organized. The tumor becomes chronic. 3. The primary inflammatory process persists, and the omental attachments around the diseased tissues persist also. A chronic tumor is formed, consisting of an inflammatory focus, surrounded by omentum (abscess). 4. The inflammation terminates, the omentum becomes freed, but its tissues are so altered by the inflammatory process that thick cicatrices remain. If they are massive enough, the chronic tumor is accessible to diagnosis.

As to cicatricial tumor-like formations, they are not very frequent clinically because the cicatricial mass is not often bulky enough to be felt through the abdominal wall. It is important, though, that we remember this variety of tumor, when swellings in the upper part of the abdomen have to be diagnosticated. The tumor will be rarely very large, it will be hard and nodulated, situated superficially and in front of the colon, and will be movable in every direction, but in a limited circle. It will not be painful on touch, not growing, and the history of the case will reveal some abdominal trouble preceding the discovery of the tumor, perhaps for years. Often the swelling will be detected only accidentally. The differentiation from tuberculous and malignant growth is easy. The absence of cachexia, pain, ascites, etc., will at once settle the benign nature. The same will be the case with pyloric cancer, or that of the gall-bladder. Perhaps some non-malignant tumors belonging to these organs may offer some differential difficulty, but, considering the perfect freedom from constitutional disturbances, and the above-mentioned peculiarities of the omental tumor, we would not be very liable to make mistakes.

Again, a movable kidney may be confounded with it, and *vice versa*. But the kidney can be replaced, can be felt from behind, is mostly covered by the colon, has a different shape and

surface, etc. Finally, tumors in the abdominal parietes may come into question. If these latter can be lifted up with the tumor, these will be no doubt left; but if the tumor should have formed adhesions with the omentum, a differential diagnosis may become even impossible.

In acute cases the underlying trouble will, of course, be the object of treatment. Nevertheless, in cases of perityphlitis or of any other intra-peritoneal infection, the suddenly appearing tumor has to be correctly diagnosticated, because only then will we abstain with perfect complacency from meddling with it. Nothing would be a greater mistake than to cut down on it for its removal. Obviously, the case would be infinitely aggravated by such an attempt. Even a simple incision must open anew the connection between the infecting focus and the peritoneal cavity, which, fortunately, had been closed by the adhesive omentitis. A different course, though, must be pursued when a greater quantity of pus has to be evacuated for the saving of the patient's life,—as, for instance, in appendicitis under certain circumstances. Here, evidently, not the omental cake is the object of the operation, but the removal of the infecting material.

But even then we have to operate with a full understanding of the omental conditions. The operation has to be performed in such a way as not to break through the partition toward the intra-peritoneal cavity. In appendical and cæcal abscesses, for instance, the incision has to be made as much laterally as possible, because we may in this way get into the abscess without encountering the omental adhesions. The pus mostly breaks through the abscess-wall on its weakest point, which is the lateral area not protected by the omentum. There the parietal peritoneum has made firm adhesions to the gut, and when the pus breaks through it gets into the præperitoneal cellular tissue in the iliac fossa. It thus forms a new abscess-cavity, connected with the first one by a more or less wide opening. This latter may close entirely, leaving only the secondary abscess, the primary one having emptied itself and healed. But even if the connection persists, the superficial cavity will contain the bulk of the purulent secretion. For such cases all that is required is a free incision into the superficial extra-peritoneal abscess-cavity, which has to be treated exactly as any other superficial abscess. If no operation is decided on, warm

fomentation over the tumor, absorbent inunctions, etc., may be tried. Rest, of course, is the great remedy, and rest especially to the bowels, so as to favor omental adhesions. Hadra gives opiates, rather than salines, whenever an omental cake appears.

The next question is: What to do with the chronic omental tumor after all inflammatory symptoms have subsided? If there is no trace of fever, no indication of persistence of the primary disease, if there is nothing but the tumor left, then our action should be based on the amount of suffering justly ascribable to the tumor. If there is no suffering it should not be touched, but if the omental adhesion, by dragging on one of the other abdominal organs, or by interfering with its blood-supply, should do harm, he does not see why it should not be done away with. Especially is this a necessity after laparotomies, whose aims often enough become frustrated by such new and unforeseen accidents. Therefore, if massage, warm baths, resorbent internal and external treatment have failed, a new laparotomy ought to be performed, the omentum detached, and as much of it as seems necessary cut away. If we do not resect the detached fringes, there is great danger that they attach themselves anew. It is true, the cut surface of the omentum has also the tendency to fix itself to the nearest serous membrane, but it will then come in contact with healthy tissues, and the liability to new adhesions is greatly lessened.

The treatment in such abscesses as are surrounded by an omental bull ought to be similar. If it can safely be done, the omentum ought to be detached and removed; but in such cases where there is danger in tearing away the adherent parts of other structures, especially of the bowels, it has been sufficiently demonstrated by experience that it is safer simply to empty the abscess. It is remarkable how, after the cause of the irritation has been removed, the parts may become separated from each other, and how quickly they may regain their normal conditions. But even if the omental tumor should remain, it will be the lesser of two evils.

In conclusion, a few words in regard to the treatment of the cicatricial endo-omental tumor: As it is harmless, no sensible surgeon will think of meddling with it. The uneasiness of the patient will best be relieved by an explanation of the nature of the trouble.

The remarks of A. F. Currier, of New York, ⁶¹_{July}, on the management of the omentum in abdominal operations will not be out of place in this connection: (1) the omentum should be preserved as nearly intact as the conditions of each individual case will allow; (2) great care should be exercised to avoid wounding it in making the abdominal incision, or bruising or lacerating it at subsequent stages of an operation; (3) badly-injured portions should be resected with all due precautions, also such portions as cannot be so replaced as to occupy their original position and perform their normal function; (4) before closing the abdominal wound it should be carefully and evenly replaced as the natural covering of the intestine. Von Winiwarter, of Liège, Belgium, ²⁹⁸_{Jan} reported several interesting cases of lipomatous hyperplasia of the omentum in which reflex nervous troubles were produced. In one pressure over the site of the tumor caused epileptiform spasm, which never recurred after removal of a lipoma weighing 1½ pounds from the omentum. In the second case intense pain on pressure and syncope were occasioned by a lipomatous mass as large as a child's head, and which, owing to its location, caused the case to be taken for one of umbilical hernia. Pressure of the truss was naturally intolerable. The third case was due to traumatism. In all the operation was followed by no untoward symptoms.

MESENTERY.

Sarcoma.—Llobet, of Buenos Ayres, ⁹¹_{Aug}; ²_{Sept. 12} removed with complete success a sarcomatous tumor of the mesentery, and at the same time resected a portion of the small intestine almost five feet in length. The patient, a man aged 23, whilst under treatment for urethral stricture, was found, quite by accident, to be affected with a very movable, hard tumor of about the size of the kidney, which was situated within the abdominal cavity in the middle line, and about two inches below the umbilicus. The patient asserted that he had not at any time suffered from symptoms of disturbed digestion or from pain in the abdomen. The growth was free from tenderness save on forcible compression. Llobet was led to reject the idea of a floating kidney by reason of the absence of urinary troubles and of the free lateral mobility of the growth, and, guided by the facts of the situation of the swelling in the middle line and of the absence of pain and of both general

and local disturbance, he was disposed to regard it as a tumor of the mesentery. At the end of 1890 laparotomy was performed for the removal of the growth. A globular tumor was exposed, involving both layers of the mesentery, and covered in front by a long loop of small intestine. The portion of mesentery between the tumor and the intestine was traversed by numerous large blood-vessels. It was thought to be necessary to remove with the tumor the portion of small intestine adhering to its anterior surface. Its retention in the abdominal cavity after dissection from the tumor would, it is held, have exposed the patient to the almost certain danger of relapse and of wide and general diffusion of the disease, and, moreover, the retained portion of intestine would very probably have become gangrenous as a result of removal of the corresponding portion of mesentery and of arrest of the vascular supply. After a thick ligature of catgut had been applied to the portion of mesentery attached to the tumor, the fixed portion of intestine, the length of which measured one metre and a half, was resected, and the two open ends of the divided intestine were brought together by sutures arranged in two layers, one set being carried through the mucous coat and the other set through the muscular and serous coats. The tumor was then excised by means of curved scissors, the bleeding being arrested by the application of the thermo-cautery. The operation, which was performed with strict attention to all antiseptic precautions, lasted two hours and a half. The patient, who was able to get up and sit in a chair on the fifteenth day from the date of the operation, made a good recovery.

Llobet draws from the facts of the case the following conclusions: 1. Whenever a diagnosis has been made of sarcoma or fibrosarcoma of the mesentery the surgeon, unless the growth has attained very great dimensions, should resort to extirpation. 2. The operation should be performed as soon as possible, and before the tumor has become very large; it is then less serious, and there is less probability of subsequent generalization of the disease and of its local recurrence. 3. In cases in which the diagnosis is doubtful the surgeon should perform an exploratory laparotomy. 4. If the intestine be found adherent, even over a considerable extent, there should be no hesitation in performing enterectomy. 5. Resection of a considerable length of small intestine is attended

with the less risk the farther the resected portion of intestine is away from the stomach.

Another case is reported by F. A. Dunsmoor, of Minneapolis, ¹⁰¹_{Aug. 18}, the operative procedure being about that of the preceding. Although complete recovery ensued, a curious incident placed his case in jeopardy for quite awhile. Having exhausted his supply of silk, a piece was secured from the hospital stock, and, though drawn from the bottle as usually prepared in the stores, this stitch suppurated, and eventually contaminated nearly the entire external wound.

Serous Cysts.—Terrillon ⁹⁰⁸_{July; Oct. 2} reports 3 operations for the removal of cysts of the mesentery in women of the ages of 18, 22, and 23, respectively. He finds that serous cysts of the mesentery present several clinical features sufficiently characteristic to allow of precise diagnosis in certain cases. They are generally situated in the median or lateral part of the abdomen. They exhibit no evident connection with organs which usually give rise to abdominal cysts,—the ovary, liver, and kidney. There are exceptions to this rule, as a mesenteric cyst may grow till it becomes closely applied to one of those organs. A loop of intestine may lie on the surface or side of the cyst, causing resonance on percussion. The cyst is often fairly movable, especially from side to side. Fluctuation is marked, even when the cyst is tense; but, as the tumor is often easily displaced, it should be fixed by the hands pressed against the abdomen before percussion of its surface. When a mesenteric cyst is clearly perceptible, on inspection it may hold from 5 to 10 pints (2½ to 5 litres) of fluid. The cyst is not lined with epithelium. The fluid which it holds is serous, slightly colored, and often assumes an appearance which has been compared to a decoction of chalk. The cyst-wall is, as a rule, intimately adherent to the laminae of the mesentery between which it has developed and to the intestine. Hence, the surgeon must never attempt complete enucleation when this adhesion is marked, else he may tear open the intestine, make holes in the mesentery, or endanger the vitality of neighboring structures by dividing large vessels. There is reason to suppose that these cysts have occasionally a traumatic origin. Puncture through the abdominal walls is unsatisfactory, and may involve injury to the intestine. He advocates abdominal section, tapping, and cautious removal of as much of the cyst-wall

as can safely be peeled off from its connections. The edges of the orifice thus made in the cyst are stitched to the abdominal wound; then the cyst is drained, and it will slowly close. Blood-cysts and chyle-cysts may often be enucleated with ease and safety. Great care must be taken in the after-treatment of drained mesenteric cysts. Free packing with iodoform gauze is useful, but, when the cavity is large, so much iodoform may be absorbed as to cause poisoning. In one of Terrillon's cases syncope, thread-like pulse, and delirium set in, and did not abate until salol gauze was substituted for iodoform. Salol is less poisonous, but less antiseptic, and, therefore, salol dressings require more frequent changing than does iodoform gauze. The cavity at first diminishes rapidly, but a fistulous track is left, which takes about three months to close. The 3 cases recovered.

An interesting case is reported by A. W. Abbott, ¹⁰⁵_{June 16} in which he remarks that, in view of the fact that the abdomen had contained large amounts of fluids for 19 years; that there was no jaundice, or hepatic enlargement or atrophy; that the urine was normal, and that a cyst could doubtfully be made out through the vagina, he was led to establish a possible diagnosis of semi-fluid, adherent, ovarian or parovarian cyst. On referring to the literature of the subject, however, he found that in every case of the same kind, followed by an operation, the same error in diagnosis has been made. This is, however, of little importance, he thinks, provided the surgeon is able at the time of operation to appreciate the true condition, and is ready to carry out the appropriate treatment. His case ended in recovery. The same result followed an extirpation of such a cyst by Duret and Lancial, of Lille. ²²⁰_{Dec. 19, '90}

Lipoma.—Lauwers, of Courtrai, Belgium, ⁵²_{Apr. 18} reported a case of lipoma of the mesentery, the existence of which had been noticed fifteen days after birth. It was located in the right hypochondrium, was about the size of a fist, and continued to grow until the operation, when it filled four-fifths of the abdominal cavity. The child was then 7 years of age; the incision was made along the external border of the right rectus, and the tumor removed transperitoneally, the enucleation being quite difficult. The operator ligated the pedicle of implantation in four subdivisions, and cut each about one centimetre above the ligation. Catgut sutures were employed to suture the peritoneal incision opposite the parietal

opening, a portion of the latter being left patent. This opening was tamponed with iodoform gauze, supplanted three days later with sublimate gauze. Union was complete in a week, and one month after the operation the child was in perfect health. The tumor weighed 15 pounds.

Laceration.—H. C. Dalton, of St. Louis, ⁶⁵_{Nov} reported the following case: F. R., aged 48, admitted to the hospital January 15, 1891. Eleven and a half hours before admission the patient fell from a wagon, and, while on the ground, a companion jumped from the wagon and accidentally landed on patient's abdomen with both feet. When admitted the patient was in great agony; abdomen swollen, and very tender to pressure; temperature, 103° F. (39.5° C.); respiration, 42; pulse, 132; and no bruises or abrasions found on the abdomen. A laparotomy was performed, a four-inch incision being made in the median line. About 2 quarts (2 litres) of blood were washed from the peritoneal cavity. The mesentery of the ileum was found torn through to the extent of about a foot parallel to and about two inches from the gut. The intestine was dark in spots, showing commencing gangrene. A foot of the ileum was resected, commencing about an inch above the cæcum; a V-shaped piece of the mesentery was removed, and the ends brought together by circular enterorrhaphy. The operation consumed an hour and a half. Patient died ten hours after the operation, reaction never having taken place. The great length of time (eleven and a half hours) which intervened between the time of receipt of the injury and the time the patient was brought to the hospital and operated upon conspired to precipitate the fatal termination, for by that time peritonitis had become general.

PERITONEUM.

Peritonitis.—Krecke, of Munich, ³⁴_{Nov. 22, 24}; ⁶_{Oct. 10} has collected from various sources the results of laparotomy in diffuse purulent peritonitis, and points out that the operation has been the means of saving many lives; for, although the statistics of peritonitis treated medically show a mortality considerably below that given by laparotomy, it is clear, as he says, that a large majority of the successful cases in the first category are such as would never be submitted to surgical treatment, many of them being referable to inflammatory lesions of the female pelvic organs, and not of an in-

fective kind. Surgical intervention is, on the other hand, called for in cases of general infective peritonitis, such as arise from perforation or in the puerperal period, or from extension of suppuration from other parts. Krecke points out the difficulties of securing effective drainage, and is averse to irrigation, owing to the possibility of its disseminating septic material to parts of the membrane not previously infected, or of exciting hæmorrhage. He prefers rather a simple incision, drainage, and the use of iodoform gauze. Peritonitis is fatal from septicæmia, due to the absorption of poison from the cavity; but it is remarkable how tolerant the membrane may be of such virus. If the limit of this tolerance could be gauged, some guidance might be obtained as to the appropriateness of surgical interference in any case. But the fact is, that there are various degrees and forms of acute peritonitis, some being fatal from septic absorption within a few hours of the onset, before any noticeable change takes place in the membrane itself. Early operation is then called for, and consideration must also be had to the source of the inflammation. The statistics adduced are interesting and instructive. Krecke has collected 119 cases of laparotomy in general peritonitis, the origin of which was determined in all but 18, of which 9 were successfully treated by laparotomy and 9 died. The majority of the remaining 101 cases belonged to the category of perforation peritonitis. Of these, 36 were cases of general peritonitis following perforation of the vermiform appendix; 12 were cases of typhoid perforation (a condition which at first sight it might seem hopeless to deal with), and these yielded 5 successes; 12 were due to perforation from gangrene and other causes implicating the bowels; of the gangrenous not 1 recovered, and of the 8 others only 3 were cured by the operation. Of traumatic cases 3 of punctured wounds and 1 of gunshot wound recovered, but of contusions only 3 out of 8 cases recovered from laparotomy. The measure, however, saved 5 out of 13 cases of puerperal peritonitis. Lastly, a group of cases of peritonitis from various other causes gave 3 deaths and 6 recoveries. The total result is 119 cases of general peritonitis treated by laparotomy, 51 recoveries and 68 deaths,—statistics which are certainly encouraging.

W. A. Stewart⁸⁰ reviews an instructive case reported by Henoch, of Berlin, Jan. 20⁴—“A Case of Purulent Peritonitis Cured by

Laparotomy": "The subject, a female child 4 years old, was seized with fever (38.8° C.— 101.5° F.), vomiting, colic, and diarrhoea, and after fifteen days was sent to the hospital. On examination, the child seemed rickety, with the characteristic ball-like abdomen and projecting navel, but around the navel was a circular spot as large as a five-mark piece, bright red, and very sensitive. In the linea alba, six centimetres above the navel, lay a fluctuating prominence, with very thin integument, about as large as a pigeon's egg. This extended, still fluctuating down, into a congenital cleft, about two centimetres broad, in the linea alba. The child lay very quietly on its back, with its legs drawn up, still, because the slightest motion caused it pain. The diaphragm stood high, the heart was displaced till its impulse could be felt in the second and third costal spaces, but the temperature, now at its highest, was only 37.9° C. (100.2° F.). All the symptoms, namely, almost universal, constant dullness, except in the epigastrium and at the ribs on the right, the redness around the navel and the bulge above it, the vomiting, etc., increased in severity; and, three days after admission, an experimental puncture was made just above the navel, and the result was thick pus, in which there were no bacilli (he does not state whether or not the pus was either fetid or feculent). The urine was normal. The following day an incision two and one-half centimetres long was made by Bardeleben, between the navel and xiphoid process, and 2000 grammes (4 pints) of very thick pus with clots of fibrin were removed and a drainage-tube introduced. Recovery followed without a trace of fever. Ten days after the operation the wound was closed, and on the 10th of March, a few days over the month, the child went out cured, but, unfortunately, was never heard of afterward.

"To what was the purulent peritonitis due? Our author can give no decided reply. He objects to it being called rheumatic peritonitis, which is only a phrase, he hints, to cover ignorance. He does not think it due to perforation, which would have run a much shorter course. Were it not for the favorable result, he would be inclined to consider it a case of tubercular peritonitis (as it is quite a common event to make numerous preparations before finding even a couple of bacilli)."

Many such cases described as cured by laparotomy have been cases of chronic tubercular peritonitis. But the rapid recovery

makes it seem to him very improbable that the case was tubercular. The lesson the case teaches is to open the abdomen without delay in cases of purulent peritonitis.

C. H. Dalton, of St. Louis, ⁶¹_{Nov. 7} has become so skeptical on the subject of temperature as a guide in peritonitis that, in considering the advisability of an operation in abdominal cases, he is no longer guided by the thermometer. He takes the temperature in all cases, but does not let the lack of fever influence him against operation when other symptoms, upon which he has learned to place far more reliance, would move him in the opposite direction. Surgeons find it difficult to convince the average physician that a violent peritonitis may exist without a normal or even subnormal temperature, for the teaching of some has heretofore been that sepsis is always accompanied by an elevated temperature.

Several weeks since, he was called in consultation in a case of intestinal obstruction in which peritonitis was present. He advised operation, and was met with the objection that there could not be much peritonitis with a temperature of 99.5° F. (37.5° C.). He pointed in vain to the patient's anxious countenance, to the great tenderness on pressure, the distended abdomen, the vomiting, the pulse, as well as the fact that purgatives had been tried without avail. The doctor in attendance insisted upon one more dose of salts. It was given; it did not move the bowels; the patient died. Time and again he had seen cases of intestinal obstruction with stercoraceous vomiting, rapid pulse, anxious countenance (*facies abdominalis*), in which the temperature was about normal or even abnormal. In his earlier experience the lack of fever in abdominal cases puzzled him very much, and led him astray in a number of instances. While it is well to remember that fever, when present in abdominal cases, indicates peritonitis, its absence does not warrant us in saying that peritonitis is not present, and should not blind us as to the actual condition.

Reviews of the subject and reports of cases were published by W. E. B. Davis, of Birmingham, Ala. ¹_{Apr. 4}; A. V. L. Brokaw, of St. Louis ³²_{Oct. 21}; E. Lauwers, of Courtrai, Belgium ⁵²_{Sept.}; and J. B. Deaver, of Philadelphia. ¹¹²_{Sept.}

L. Carvi, of Rome, ⁵⁸⁹_{Nov. 1895}; ⁹⁶_{Nov.} employs permanent drainage in cases of chronic idiopathic peritonitis where the disease defies all methods of treatment and the ascites re-appears in spite of repeated para-

centesis. During the first few weeks the fluid is drawn off once in twenty-four hours, and in a case of the author's it varied in amount from 500 to 1000 grammes (1 to 2 pints); then every two, every three days, and, finally, once a week. Gradual improvement usually takes place under this treatment. Russo Antonino, of Rome,⁵⁸⁹ reported a successful case in which the drainage was established through an umbilical cicatrix.

Post-Operative Traumatic Peritonitis.—L. Jullien, of Paris,³ severely criticizes the inaction observed by operators in general in cases of peritonitis following abdominal operations. To illustrate his point, he described the case of a young woman in whom, during a prolonged laparotomy, the pyogenic sac had ruptured, followed the same day by acute peritonitis, although all measures indicated in such a complication had been carried out before the closure of the abdominal wound. The next morning the patient was apparently moribund, with all the evidences of marked acute peritonitis. Jullien opened the wound partly, cutting two stitches, and thoroughly washed out the abdomen with 5 quarts (5 litres) of a solution of boric acid and 1 quart (1 litre) of a solution of carbolic acid. This was at 11 o'clock. At 3 o'clock that afternoon the patient had completely revived. He renewed the washing four times, each time adding to the sedation of the patient. In addition to this he had kept a bladder of crushed ice over the dressing, which consisted of four compresses imbibed with a corrosive-sublimate solution (1 to 1000). Recovery was uninterrupted and rapid.

Tuberculous Peritonitis.—The surgical treatment of tuberculous disease of the peritoneum, independently of its practical importance, is of great scientific interest on account of its mysterious and inexplicable *modus operandi*. Alexandroff, of Moscow,^{24 28} recognizes three principal forms of tubercular peritonitis: (1) masses of tubercle disseminated in the peritoneal cavity, without ascites; (2) cystic accumulation; (3) scattered tubercles, with general ascites. The progress is acute, subacute, or chronic. Except the ascitic form, which is often mistaken for simple ascites, and yields most readily to tonic treatment and frequent punctures, the various forms of peritoneal tuberculosis are of grave import, and have been thought by Hensch to be incurable. The earlier cases of surgical treatment of tubercular peritonitis were due to

mistaken diagnosis. The results, however, were so encouraging that cases multiplied rapidly. (See König below.) The operation consists in a large section of the abdomen, with evacuation of the fluid; other proceedings are accessory only, and have but a slight influence on the result. The relief is not of a temporary character, its persistence having been maintained for two, twelve, and twenty-five years. In some cases a post-mortem examination has shown a complete disappearance of all tubercles. Before dealing with the results obtained by operation, the author records his own personal experience, of which the following is a brief abstract: Anna K., a little girl aged 3 years and 9 months, was admitted September 8, 1890. One brother had died of tubercle. Whooping-cough at 2 years of age, which continued five months. Since July, 1890, diarrhœa, enlargement of the abdomen, fluctuation, temperature 30° to 39° C. (86° to 102.2° F.). On the 11th of September chloroform was administered, an incision five centimetres in length being made between the umbilicus and the pubes; evacuation of the fluid; insertion of a small drainage-tube. The wound was closed by deep sutures; iodoform dressing. A portion of the peritoneum examined under the microscope showed giant-celled tubercles. On the 23d of September the sutures were removed, the wound having healed by first intention; temperature lower. On the 27th there was jaundice, fever, cough, and œdema of the malleoli; on the 30th, improvement in all symptoms. October 4th, fever continues; the bowels enlarged, fluctuation in the lower part. October 10th, wound re-opened; the two sections of peritoneum united by a gelatiniform substance, covered with tubercles of a cartilaginous consistence. Washing with a boric-acid solution; light dusting with iodoform; drainage. October 22d, fever subsides; the swelling diminishes; the patient gains weight; cured. The jaundice mentioned was of a fleeting character, the course of which was not modified by the second operation. An attempt has been made to explain the action of laparotomy by the influence of light on the bacillus of Koch, but in cutaneous diseases the action of light on the bacillus is of much longer duration, which does not arrest their development. König explains its action by the suppression of the peritoneal cavity, an hypothesis which the above case appears to corroborate. Notwithstanding the frequency of tubercular peritonitis in childhood, curative laparotomy has only

been practiced twenty times under 15 years of age, including the foregoing case, according to Alexandroff,—twice in a child 2 years old, twice in a child 3 years old, twice in a child 5 years old, once at 7 years old, once in a child aged 8, three times in children aged 10, three times in children aged 11, twice in children aged 12, four times at 13, twice at 14, and once at 15; of these children, 6 were boys and 13 were girls. In all the 20 cases the result was good, the patients having been cured. In 2 cases there was a relapse; a second operation, performed after an interval of a month, was successful. Laparotomy is one of the best methods of treating tuberculous peritonitis in children.

König, of Göttingen,⁴¹_{Jan. 5},⁶_{Jan. 21} has collected 131 cases of laparotomy for tubercular peritonitis (11 male, 120 female). His personal experience consists in 14 of these, of which 6 were completely cured; most of the patients (70 per cent.) were over 20 years. He states that laparotomy will cure one-fourth of all cases; 107 were much ameliorated; some have remained well for lengthy periods, viz., twenty-five, thirteen, nine, eight, and seven years. The danger of the operation is not great—only 3 per cent. mortality—as opposed to the fatal nature of the unattacked disease. The chief elements of success appear to be the employment of not too small an incision, and the thorough evacuation of fluid and removal of tubercular masses and organs. Lavage with strong antiseptic solutions was performed in 80 cases, and without such in 50 cases. It is noticeable that more cases healed *without* antiseptic lavage. In the future, careful microscopical examination should be made of the evacuated *débris* in every case, in order to explain the mystery of the healing process. König gives the following valuable statistics from Göttingen Pathological Institute. Out of 2230 post-mortems there were 107 cases of tubercular peritonitis (4 per cent.). Of these, 89 were males and 18 females. In 99 tuberculosis of the lungs was co-existing; only 8 cases were therefore free; 60 had more or less severe pleural complication; 80 had ulceration of the gut (74 per cent.); 44 had affection of the mesenteric glands (41.6 per cent.); 38 had tubercle of the kidneys; 40 had the spleen affected; 4 of the 18 females had tuberculosis of the tubes and ovaries.

H. Ruskin Hancock, of Burslem,²_{Dec. 27, '90} reported a case of chronic tuberculous peritonitis with effusion treated by abdominal

section, with irrigation and drainage. The patient was a girl aged 15. Abdominal section was performed on May 7th, a very large quantity of fluid draining away. On opening the abdomen there were considerable peritoneal adhesions, and a large quantity of tubercle appeared in the peritoneum as a diffuse miliary deposit. The peritoneal cavity was well washed out with water which had previously been boiled, a glass drainage-tube inserted, and replaced in six days by a soft-rubber tube. After the removal of the tube considerable draining of fluid took place, and continued for some weeks. The patient made a good recovery. Her weight, which in the first week of May was 86 pounds, was 96½ pounds in the last week of August. After this she gained 2 pounds in weight during September, and on November 27th she weighed 112 pounds.

A. Vander Veer, of Albany,⁸¹ in reporting 4 cases, remarks that there have undoubtedly been many cases of alleged tuberculous peritonitis which were not strictly such in their character; and still it may not always be easy for us to determine beforehand as to the presence of tubercles. Tapping has certainly failed in removing fluid in which bacilli were to be found, and yet they were present when operation was resorted to. There can be no doubt that in primary tubercular peritonitis abdominal section and drainage is the proper line of treatment; but we should classify our cases with great care. When making a diagnosis, a careful bacteriological examination should also be made, so that cases of simple lymphoma of the peritoneum be excluded. In general tuberculosis, where other organs are implicated, where the inguinal glands show evidence of lymphatic infiltration, or if there is evidence of tubercular enteritis, the operation can only be, of necessity, palliative in its results.

Parker Syms, of New York,¹ after reporting a successful case of his own, concludes, from a careful study of the reports of laparotomy in tuberculosis of the peritoneum and of the various essays upon this subject: 1. That the danger of the operation is very slight. At present, the death-rate is but 3 per cent. 2. That sepsis is not so likely to occur in these peritonea as in laparotomy on healthy ones, on account of the pathological changes which have taken place in the membrane. 3. That tubercular infection of the wound does not occur. 4. That disinfectants are useless,

and that drainage should not be used, as it is likely to result in a permanent sinus. 5. That in unsuccessful cases the operation at least does no harm. Most of the patients who have died at a time remote from the operation have succumbed to general tuberculosis or to a tuberculosis of some other organ. 6. That established—not advanced—pulmonary tuberculosis is an indication for and not against the operation; for the improvement gained enables the patient to better resist the phthisis, and, if this latter is but incipient, recovery may take place. 7. That laparotomy is the proper form of treatment for these cases. In some unknown way it exerts a most beneficial influence upon the disease, resulting in cure in a large proportion of cases and in a marked improvement in nearly all.

J. C. J. Fenwick²_{Oct. 1, 1901} reports a case of tuberculous peritonitis treated and cured by tapping. W. S., aged 9, admitted on February 23d. An emaciated lad, with no appetite. Abdomen distended by fluid, with usual signs; circumference at navel, 26 inches; no signs of tuberculosis of chest, joints, etc; no pyrexia; no morbus cordis. Treated by ung. hydrargyri on flannel belly-band, renewed daily; ol. morrhuæ and Parrish's food internally. March 6th, fluid in abdomen has steadily increased; circumference at navel, 29 inches; temperature, 101.2° F. (38.4° C.), evening; urine, 30 ounces (900 grammes) *per diem*. 7th, abdomen very large; temperature, 104.5° F. (40.3° C.) at noon; respiration and pulse very feeble; brandy ordered; patient apparently dying. Abdomen aspirated at usual spot, and 15½ ounces (465 grammes) turbid ascitic fluid removed; much relief afforded by this. Temperature next morning, 90.6° F. (32.5° C.). March 10th, circumference at navel, 25½ inches; no liver mischief found; quinine given now occasionally for reactions of pyrexia. Tapping performed again for recurrent accumulation on March 20th and 25th, and on April 3d and 12th. April 15th, ordered calomel gr. ij (0.13 gramme) o. n. 17th, ordered mixture containing tinct. digitalis ℥iij (0.18 gramme) t. d. s. Urine since March 12th, 10 to 15 ounces (300 to 450 grammes) *per diem*; now steadily increases in quantity. May 10th, calomel powders stopped. 14th, digitalis mixture stopped. The abdomen now remained quite free from fluid, pain, and tenderness; heart's apex assumed nearly normal position; appetite increased; whole body comparatively plump;

primæ viæ regular. 28th, has been getting up for last three weeks; abdomen quite free from signs of mischief; is now a romping lad, full of life and activity; eats and sleeps well; circumference at navel since May 3d, $23\frac{1}{2}$ inches. 29th, discharged cured. On August 11th the condition was as follows: "Abdomen resonant on percussion; no signs of any ascites; no pain or tenderness on pressure. General condition, anæmic; keeps fairly well, but no gain of strength; bowels loose; no cough or night-sweats; he looks fairly well, gets to school, and seems likely to go on well." (The "cure" in this case is evidently still a mooted question.)

Roswell Park, of Buffalo,⁹⁶_{July} selected, as one of his subjects for the Mütter series of lectures, that of peritonitis. The article reviews the following questions: Peritonitis—the peritoneum and its capability of absorption; rapidity of same; influence of any ascitic fluid present; effect of injections of various pyogenic organisms, and in varying quantities; infection of peritoneal wounds; forms of peritonitis; conditions under which infection takes place; improbability of a pure type of gonorrhœal peritonitis; distinction between septic and putrid forms of peritoneal inflammation. Reviews, with reports of cases, were published by James F. W. Ross, of Toronto; George Elder, of Nottingham²⁶_{June}; M. Price, of Philadelphia⁶¹_{Aug. 1}; L. N. Varneck,⁵³⁰_{No. 1, p. 11} and G. P. Fari-bault, of Paris,²²¹_{Aug.} which, with the several cases reported independently, attest in a forcible manner to the value of laparotomy in tuberculous peritonitis. Schwartz, of Paris,³_{Dec. 10, '90} reports a case which, though apparently cured for a long time, returned with the original symptoms.

In a recent paper on "The Curative Effect of Operations *per se*," J. William White⁹⁶_{Aug., Sept.} discussed the question of the *rationale* of the cure of peritoneal tuberculosis by laparotomy. Tuberculosis of the peritoneum, he thinks, is dependent upon extension of the tubercular inflammation from adjacent organs or to direct infection by means of the bacilli circulating with the blood. Phillip's pathological studies showed that, of 107 cases of tubercular peritonitis, the lungs were involved in 99, the pleura also in 60, and the bowel in 80. The frequency of intestinal invasion by tubercle is well known. The serosa becomes quickly involved, but this involvement may remain strictly localized, and may undergo spontaneous resolution if the original source of

infection, the intestinal lesion, cicatrizes, as autopsy findings show that it frequently does. When, however, the peritoneal involvement comes from a large organ, and is extensive, it is as difficult to conceive the *rationale* of spontaneous resolution as it is to explain in what way operative procedure, excepting that of total ablation of the disease, can possibly be of the slightest avail. Yet the fact remains that a gratifying percentage of success follows simple opening and intra-abdominal manipulation in cases of tubercular peritonitis.

Tait says, with his usual positiveness, that a therapeutic change is effected in the peritoneum itself by a mere opening of the cavity, and calls attention to the distressing thirst which is uniformly produced by opening the cavity only a finger's breadth, but is not seen if the operation stops short of that.

The matter cannot be dismissed so easily, however, but may, perhaps, be better understood by a reference to the circumstances, and the general pathological laws that apply to them.

Cabot has recently summarized the evidence at present in our possession in regard to the method by which simple laparotomy cures tubercular peritonitis. He calls attention to the fact that Hirschfeld and others have shown that the tubercles actually disappear from surfaces where they have been known to exist, and quotes Van de Warker in reference to the two ways in which the accumulation of ascitic fluid may, perhaps, act to intensify the morbid process; first, through its mechanical irritation by pressure, or by some unexplained irritating quality in its constituents; and, secondly, by acting as a medium for the propagation and distribution of the tubercle bacilli. This explains the effect of the effusion in favoring the spread of the disease, but there still remains to explain the actual disappearance of already existing tubercles, which follows the removal of the effusion. Upon this point, Van de Warker says: "The irritated peritoneum is given a rest, and allows of a process that belongs, *per se*, to tuberculosis, namely, the thickening and induration of the surfaces—an incapsulation—and which, Hegar suggests, may be a stage in spontaneous cure." Cabot thinks "that this suggestion of Hegar's is of the greatest interest, and that it is probable that the rest afforded to the peritoneum is of importance in allowing it to set up its process of induration, and so to resist the advance of the tubercles."

When, however, the ascitic fluid is wholly removed, and the peritoneal surfaces fall together and acquire adhesions, the tubercles are then shut in between the coils of intestine, the omentum, and the abdominal wall. They are thus surrounded by tissues in a high degree of activity, which can now throw around them the limiting zone of young cells, and eventually fibrous tissue, which, if the tubercular process is not too far advanced, may effectually resist it and cause it to retrograde, the process being analogous to that which we see imperfectly going on around a cancerous growth.

It rarely happens that the vigorous growth of a cancer is definitely arrested by this effort of the surrounding tissues; for, while it is held in check in one direction, it extends itself in many others, and breaks through the comparatively feeble barriers thus opposed to its progress. In tuberculosis, however, we have a process of much less vitality, and which, occurring in younger subjects, is often successfully hemmed in and destroyed by the healthy tissues about.

INTESTINES.

Anastomosis.—W. S. Halsted, of Johns Hopkins, Baltimore, ⁷⁶⁴_{Jan.} describes a new method of intestinal anastomosis which he tried on a series of dogs. Three of these having been killed, the results were very gratifying. In 2 of the specimens there were no adhesions; in 1 there was a delicate adhesion at one spot between the omentum and the line of suture. He considers that the success of any form of intestinal suture is inversely proportionate to the extent of the adhesions which result from the employment of the particular method, and he ascribes success of his experiences to a proper appreciation of the importance of the submucous coat of the intestine. Halsted thinks it remarkable that no one has recognized the important part which this coat should play in operations for intestinal suture; that it is still more remarkable that surgeons could have altogether overlooked the existence of the submucosa, and that it is perhaps even more remarkable that experimenters and writers on the subject of intestinal suture should without exception believe that it is possible to take a stitch of the peritoneal coat alone. The crude views of Jobert and Lembert as to the construction of the wall of the intestine have been universally accepted by surgeons up to the present time. The

peritoneal coat is believed to be thick enough and sufficiently strong to hold a stitch, and the existence of the submucous coat has been ignored. About four years ago ⁵ he endeavored to emphasize the importance of the submucous coat in operations upon the intestine, but only succeeded in attracting attention to the quilt or square stitch, which he still employs in all sutures of the intestine. The peritoneum is so thin that one cannot represent it by the finest pencil-stroke unless the wall of the intestine be magnified to a thickness of about five centimetres. It is absurd, therefore to speak of a stitch of the serosa. A stitch which includes only the peritoneal and muscular coats is a very weak and unreliable one. The submucosa is an exceedingly tough coat. A thread of it is sufficient to insure the safety of the stitch. Each stitch should include at least a thread or two of the submucosa. If the submucosa be perforated, the intestinal lumen is almost certainly entered. Sufficient resistance is offered to the point of a needle by the submucosa to enable one with a very little practice to recognize this coat as soon as it is encountered, and to take up a small bit of it without entering the lumen of the intestine.

W. J. Gillette, of Toledo, ⁸¹¹ after experiments on 60 dogs, concludes that while an anastomosis, such as that of intestine to the stomach, or gastro-enterostomy, is a very successful and easily performed operation, and the results are nearly as good as we could wish, the anastomosis of a distended intestine above to a collapsed intestine below the seat of obstruction is quite another matter. Of all the dogs in which an artificial complete obstruction was created, and in which he waited until the intestine on the proximal side of the obstruction became distended to any extent before an anastomosis was made, nearly every one died. Alluding to the fact that many prominent surgeons recommend that circular enterorrhaphy should never be done, and that an anastomosis be always made, he thinks that none of the objections enumerated are valid, and considers circular enterorrhaphy a much more simple and safe operation, if the resected ends of intestine are anything like the same calibre, than an anastomosis under like conditions.

At a meeting of the Royal Society of Physicians of Vienna, von Hacker, of Vienna, ^{113 101} exhibited a case in which, four and one-half years ago, he had performed an entero-anastomosis by lateral apposition,—the first operation of the kind successfully per-

formed. The patient, a girl aged 15, was admitted to Billroth's clinic with an intestinal stenosis. At the operation the cæcum and posterior portion of the ascending colon were found to have been converted into a tumor twenty centimetres in length, which was so intimately connected with the subjacent parts that resection was excluded. A longitudinal incision was therefore made in the ileum and colon, and the two openings were approximated by sutures. A second circular stenosis was found in the small intestine, which was removed by incising the gut in a longitudinal direction, and suturing it transversely. The patient made a rapid recovery. Von Hacker has operated in a similar manner on a case of recurrent carcinoma of the cæcum, the patient surviving seven months after the operation. This procedure has been resorted to sixteen times by other surgeons, and usually with success.

R. H. M. Dawbarn,⁵⁹_{June 27},⁹⁶_{Dec.} as the result of many experiments on dogs, is satisfied that plates cut from raw potato are the best aids to intestinal anastomosis, whether for emergency work or for that performed after deliberation. For use in the human gut the plates should be made about one-third of an inch in thickness, possibly a trifle thicker. To prevent the thread from cutting through, it should be very coarse, should have a large knot, and before passing it through the plate the thread should be passed through a bit of rubber or cloth. The plates should be so long that the opening shall be about twice the normal diameter of the gut to be operated upon, for ultimate contraction of the new hole to even half its original size is to be expected. Such a raw-potato plate is very rigid, and retains its rigidity considerably longer than any of the catgut ones. It should not be immersed in a carbolic solution before use, as this tends to make it soften more quickly.

The author describes certain modifications in the technique of intestinal anastomosis. He leaves open the two ends of the intestine between which the anastomosis is to be made until after the plates have been introduced, their anchor-stitches passed and tied, so as to secure the desired apposition of the intestinal walls by the approximation of the plates. He then further secures the intestines together by two rows of stitches passed around the periphery of the plates, the first introduced so as to cover in the anchor-stitches, and the second so as to cover in equally the first row. For these lines of suture he used a continuous basting stitch, the needle being

passed longitudinally, making about three stitches to the inch. The attachment of the two lower walls to each other having been thus fully secured, then and not till then he makes the anastomotic opening. To do this, he inserts a thin plate of wood into the open end of one bowel, so that it shall be applied over the opening in the plate, and then, with a knife introduced through the open end of the other bowel, he incises the two apposed bowel-walls as freely as the opening in the plates will allow by cutting through upon the wood, which guards against damage from the point of the knife. The adequacy of the suturing should now be tested hydrostatically, and, if all is satisfactory, the open ends of the anastomosed bowel are closed by inverting them and suturing. He also recommends, for the purpose of hastening and increasing the amount of plastic exudation, that the peritoneal surfaces which are to be brought into contact should be well scraped with a scalpel before any sutures are tied.

D. D. Crowley, of Oakland, Cal., ¹⁴⁷_{Sept.} advocates intestinal anastomosis in the following conditions: 1. In various morbid changes where cicatrices lessen the intestinal lumen, and therefore effect an obstruction. 2. An obstruction not well defined or definitely located, *i.e.*, not located within a foot or several feet of a given point, but being confident that there is a healthy intestine above and below the suspicious section, the healthy intestine can be united and a new channel formed. 3. In malignant diseases where more remote structures, as well as the wall of the intestine, are affected, it would be useless to remove the mass in the intestine; and yet life could be prolonged and made easier by an intestinal anastomosis. 4. In congenital atresia. 5. In intestines of unequal size; for instance, in uniting the ileum to the colon. They can be readily united by anastomosis, but with great difficulty after a resection where an attempt is made to unite intestines of unequal size, end to end, by Lembert's suture. 6. It can be performed in one-half the time required to unite the divided ends, and time is of much importance in a laparotomy, even with the most careful antiseptic precautions. Protection to the abdominal viscera always plays a most important rôle. 7. It has been asserted by experimenters that the removal of an extensive section of the intestinal canal is followed by marasmus, and finally death, and that the same, when permitted to remain, not acting as a conduit, is not

followed by this disaster. 8. Extensive mutilation of the mesentery is necessary in a resection, in which case several arteries must be ligated and the nourishment to the intestines partly cut off.

A successful case was reported by Terrillon and Chaput, of Paris, ³_{Dec. 2, '70} the anastomosis being between the ileum and the sigmoid flexure; another successful case, in which cartilage plates were employed, is described by M. Stamm, of Fremont, Ohio. ⁹_{Jan. 10} The anastomosis was established for a traumatic stricture of the ileum. Boiffin, of Nantes, ⁸_{Mar. 11} performed entero-anastomosis in a case of obstruction following typhlitis, uniting the ileum and the colon. The patient was completely well in eight weeks.

A. H. Cordier, of McPherson, Kan., ⁶¹_{Aug. 15} after a series of experiments on dogs, advocates elastic ligatures, recommended by McGraw, of Detroit, ⁶¹_{May 16} last year, in surgery of the intestines.

Intussusception.—Lange, of New York, ¹_{Mar. 28} described an interesting case of intussusception in which the invagination had commenced at the junction of the ileo-cæcal valve and the junction of the valve had appeared at the anus. The child had for a long time previously suffered from an intestinal catarrh, and several months before the accident which he was recording a small protrusion of the rectum had taken place. The last serious attack had occurred only a few days ago. The child was sitting on the chamber and was straining hard, when it was noticed to turn pale and to exhibit symptoms of pain. Examination revealed a large piece of the intestine protruding. The physician called in made an attempt to return the bowel, which was only to a certain extent successful. The speaker was called in consultation, and found the child's general condition such as to indicate immediate operative interference, since any further attempts must prove fruitless, and he proceeded to do laparotomy, making an incision sufficiently extensive to allow of the invaginated portion of the gut being brought well into view. It then became apparent that any attempt at traction from above would be of no avail. He then directed a colleague to push on the intestine from below, and by these combined manœuvres they succeeded in dislodging the invaginated portion until Lange could pass his hand below it from within the abdominal cavity. Persistent manipulation at last effected the reduction. The region of the ileo-cæcal valve could not be entirely disinvaginated, as there was present a hard ring,

resulting, probably, from a slight persistent invagination at this point, of long standing, giving rise to adhesions which had become permanent. As a measure of precaution, he then passed several catgut sutures between the mesentery of the ileum and the mesocolon. This little patient had made a very good recovery, though his intestinal catarrh still seemed to continue.

C. McBurney, of New York,¹ reported 2 cases illustrating the importance of early surgical interference. In a case reported by Turner and Whipham,² the principal cause of obstruction was found, after death, to have been due to a polypoid growth of the small intestine. Emphasis was placed on the necessity, in cases of obstruction requiring abdominal section, of always ascertaining that all the possible causes of obstruction have been removed. In their case there were intussusception of the polypoid growth and volvulus in two places to account for the occlusions. C. B. Lockwood,² reported a case of acute intussusception in a child aged 4 years, for which he performed resection. Death from shock occurred twenty hours after the operation. After narrating a case, in a boy aged 10 years, in which the intussusception had lasted four days and recovery followed laparotomy, Thompson,² referred to the use of purgatives in cases of intestinal obstruction, strongly urging their cautious use in conjunction with opium, and the early opening of the abdomen in case of their failure.

A case is described by Pick,⁶ in which recurrence followed by death occurred after a laparotomy. H. Marsh,⁶ obtained a recovery after abdominal section for intussusception in a child 9 months old; an unusual result, infants seldom surviving the ensuing shock. Prewitt, of St. Louis,⁸³ lost a case—an infant 7 months of age—mainly on this account, the great amount of manipulation required adding much to increase the danger. The vermiform appendix had also been removed, owing to its quasi-gangrenous condition. “Death from heart-clot” was the result of an operation, in a child 6 months old, reported by J. Y. Scott, of Washington, Pa.¹⁶¹ A fatal result in an 8 months’ infant is also reported by W. H. Crago, of Australia.²⁶⁷ In this case the cæcum and vermiform appendix were found in the rectum. Successful cases in adults are reported by Dalton and Cheyne, of London,⁶ and A. S. Johnson, of Bowman, Ga.¹¹⁷

N. Senn, of Chicago, ³⁹_{July 18} after an elaborate review of the entire subject, formulates the following conclusions: (1) intussusception of the bowels is a strictly surgical affection, and should be treated as such from the beginning, on the same ground as a strangulated hernia; (2) immediately after the accident has occurred peristaltic action should be arrested by emptying the stomach by an emetic or irrigation, by suspending stomach feeding, combined with the administration of opiates in sufficient doses to procure rest for the bowel at and above the seat of invagination; (3) prompt arrest of peristalsis procures for the affected part the most favorable conditions to arrest further invagination and to effect spontaneous or artificial reduction; (4) artificial means to effect disinvagination should be instituted as soon as this form of intestinal obstruction is recognized, or even suspected; (5) rectal insufflation of hydrogen gas or filtered air is the most efficient and safest procedure in reducing the invagination, and, if employed sufficiently early, will prove successful in the majority of cases; (6) inversion of the patient and complete relaxation of the abdominal muscles by the use of an anæsthetic are important factors in rendering the inflation efficient; (7) enterostomy and colostomy, according to the seat of the invagination, are only permissible if the patient's general condition does not warrant laparotomy; (8) laparotomy in all other cases should be done as soon as the irreducibility of the invagination has been demonstrated by rectal insufflation; (9) in acute recent cases the swelling of the intussusceptum, caused by the circular constriction at the neck of the intussusciens, often proves a serious obstacle to reduction, and should be removed, as nearly as possible, by manual compression, made direct or over a large aseptic sponge, before attempts are made to reduce the invagination by traction; (10) reduction of the invagination is accomplished most readily by making traction in opposite directions upon the bowel, above the neck of the intussusciens, and upon the sheath below the apex of the intussusception, combined with pressure against the intussusceptum in a direction from below upward; (11) if adhesions between the apposed serous surfaces of the inner two cylinders resist reduction, they should be carefully separated with a Kocher's director or a small pair of straight, blunt-pointed scissors before traction is made; (12) after reduction has been accomplished the affected segment of the bowel should be carefully

examined, and small patches of gangrene or rents of the peritoneal coat covered by stitching the peritoneum over them ; (13) recurrence of invagination is prevented most effectually by shortening the mesentery by folding it in the direction of the bowel, and fastening the fold in this position with a few catgut or fine silk sutures ; (14) if the external surface of the bowel presents evidences of gangrene, disinvagination should not be attempted, and in such cases a resection is absolutely indicated ; (15) the resection, under such circumstances, should always include the whole intussusceptum, but only so much of the intussusciens as is threatened by gangrene ; (16) if the continuity of the bowel cannot be restored by circular suturing, either on account of the difference in size of the lumina of the resected ends or inflammatory softening, the same object is attained in an equally satisfactory manner, and more safely, by lateral implantation or intestinal anastomosis ; (17) if the invagination is not extensive, but irreducible, and the bowel presents no signs of gangrene, the obstruction should be allowed to remain, and the continuity of the intestinal canal restored by making an anastomotic opening between the bowel above and below the invagination by the use of perforated decalcified bone plates ; (18) if the invagination is extensive, irreducible, and the bowel presents no indications of gangrene externally, the intussusceptum should be made accessible through an incision below the neck of the intussusciens and resected, after securing the stump with an elastic ligature, after which the obstruction is permanently excluded by an intestinal anastomosis ; (19) in irreducible colico-rectal invagination, or when this form of invagination has been caused by a malignant tumor, the intussusceptum should be drawn downward and removed by the operation devised by Mikulicz.

Intestinal Obstruction.—F. B. Jessett, of Brompton, ⁴⁹_{Nov., '90} in a review of certain forms of obstruction and their treatment, arrives at the following conclusions : 1. Obstruction of the intestines, the result of constricting bands or volvulus, is always met with either in the small intestine or the sigmoid flexure. 2. The most common cause of bands is old peritonitis, local or general. Meckel's or other diverticula may be the cause of constrictions of the bowel by snaring or twisting. 3. The predisposing causes of volvulus consists in elongation of certain segments of the intestine, abnormal

length of the mesentery, adhesions, or unequal peristaltic action. 4. The higher in the intestine the obstruction, the more severe, usually, are the symptoms. 5. All cases of obstruction should be treated by early abdominal section, and, if possible, reduction of the constricted portion of the intestine by dividing constricting bands or untwisting a volvulus; that is, if the gentle insufflation of hydrogen gas per rectum fails to effect reduction. 6. In all cases where the intestine is very distended it should be freely incised and its contents evacuated. 7. In all cases in which the constriction is irreducible lateral anastomoses by approximation discs should be practiced, so as to exclude permanently the seat of obstruction from active fæcal circulation. 8. In cases where gangrene has taken place in the loop of constricted intestine it should be excised, and the portion of intestine above and below the seat of constriction should be united by lateral anastomoses by approximation plates, the divided ends being invaginated into themselves. 9. All bands and diverticula should be removed when practicable at the time of the operation; in the case of volvulus, if the mesentery is abnormally long it should be shortened. 10. That enterostomy, or the formation of an artificial anus, should never be performed unless it is found to be absolutely impracticable to re-establish the continuity of the intestinal canal by enterorrhaphy, or by means of lateral apposition as described, on account of the collapsed condition of the patient or other cause.

H. T. Hanks, of New York, ²⁷_{v. 24, No. 4} insists on the importance of locating the obstruction in the bowel when possible, and believes that this can be done with much more certainty than is supposed, in many cases. He urges the general practitioner to send for the experienced laparotomist at once when great distress is present from obstruction of the bowels. Puncture of the abdomen he considers justifiable at such time when death seems imminent. When there is great distension of the bowel after the abdomen has been opened, the aspirator needle, or, better still, the scalpel, should be resorted to at once, to allow the escape of such gas and intestinal contents, before an effort is made to search for the obstruction.

Monprofit, of Angers ⁸_{Apr. 4} reported the case of a young man of 20 who, after suffering from symptoms of acute peritonitis in the autumn of last year, was seized, two months subsequently, with internal strangulation. The medical attendant, being convinced of

the condition of the patient, sent for Monprofit, without trying the remedies, purgatives, etc., usual in such cases. Laparotomy was performed in an out-of-the-way farm-house. When the abdomen was opened, a fibrous band entirely compressing the intestine was discovered and sectioned. The relief to the patient was immediately very great, and in eight days he was able to be up. A number of cases of strangulation by adhesions were reported during the year. F. Krug, of New York, ²⁷_{Dec., '90} described a case in which the occluding adhesions were the result of an operation for double pyosalpinx and ovarian abscesses performed a week before. The obstruction making a secondary laparotomy imperative, he was fortunate enough, on introducing his finger, to at once come upon a portion of the intestine glued down to the posterior surface of the uterus. It proved to be the descending colon, and was firmly fast as an angular loop. After pulling it loose and straightening it, he washed out the abdomen with a number of gallons of sterilized hot water, and put the patient to bed. She rallied well, and during the night flooded the bed with faecal matter. The pulse fell from 165 to 110 immediately after the operation, and the patient recovered. In a successful case reported by E. J. Cave, of Crewkerne, Eng., ⁶_{Dec., '90} the strangulation was also quickly traced. A firm, tough cord, about one-eighth of an inch in diameter, was attached to the inner aspect of the umbilicus, and passed thence downward and backward; its deep attachment was not determined. This band lay over the small intestine, tightly strangulating it against the posterior abdominal wall. It was divided on a flat director, when the intestine immediately sprang up, a deep indentation being left on its anterior aspect where the cord had constricted it. In a case operated on by J. E. Moore, of Minneapolis, ¹⁰⁵_{Jan., '18} the constriction was due to a fibrous band extending from the uterus to the sacrum. As soon as this was cut the intestinal loop immediately came to view, and at once improved in color. This case was lost, owing to delay and mismanagement, before it came into Moore's hands. W. F. McNutt, of San Francisco, Cal., ⁷⁷_{Nov.} operated on a case in which the colon was found distended to the size of a coat-sleeve, the occlusion being due to a kink in the intestine caused by adhesions following peritonitis. L. Schooler, of Des Moines, Iowa, ²⁷⁹_{Jan.} wrote a general review of the subject of intestinal obstruction, with special reference to adhesive

bands, reporting a case. Other interesting instances are reported by A. H. Small, of Riverside, New Jersey¹¹²_{Dec.}; R. J. Pye-Smith, of London²_{Mar. 14}; Thomas Jones, of Manchester, ⁶_{June 27} and F. Macbean Stewart, of New Zealand.⁵⁵⁷_{Oct.} Cases of intestinal occlusion by large gall-stones were reported by Thiriar, of Brussels³_{Apr. 1}; Le Bec, of Paris¹⁵²_{May 29}; Jonathan Hutchinson⁸⁰⁶_{July}; M. Price, of Philadelphia,¹¹⁵_{Dec.} and David Barrow, of Lexington, Ky.¹⁰⁰²_{Sept.} In the last case the calculus measured three and five-eighths inches in circumference.

Alex. McAlister, of Camden, N. J., ¹⁹_{Apr. 11} found a loop of ileum, about eight inches long, about two inches below the umbilicus, twisted upon itself from left to right. The omentum was pushed firmly against it, and the part of the intestine where the twist existed was very dark in color and looked gangrenous. He also found small spots throughout the small intestine, which also looked gangrenous. The intestines were congested and very much distended with gas, which escaped by the rectum after the twist was released. The case recovered. Torsion of the intestine was also found to be the cause in cases reported by Maurice Péraire, of Paris,⁷_{Nov.} and J. Wesley Bovee, of Washington, D. C.⁸¹_{May}

A large dermoid cyst of the ovary was the source of pressure in a case operated on by Ricard, of Paris.³_{Dec. 17, '90} In a case reported by J. Greig Smith, of Bristol,⁶_{Mar. 21} the obstruction was also caused by a tumor. Ileostomy, followed by enterorrhaphy, resulted in recovery. A. Heydenreich, of Nancy,³_{Aug. 19} reviews the subject of intestinal occlusion due to intestinal worms, and adduces a case in which he established an artificial anus. In a case narrated by Bland Sutton, of London,²²_{Sept. 16} the mischief turned out to be disease of the appendix, which was found lying over the edge of the true pelvis, its end having sloughed off; all that part of it attached to the cæcum was removed, and the whole of the peritoneal cavity freely washed out with warm water; the obstruction had evidently been due to peritonitis.

Thomas Bryant, of London,⁶_{Jan. 17} in reviewing the treatment of intestinal obstruction and strangulation, held that where belladonna as an external application arrests peristalsis and soothes pain opium is not needed. In many cases it is, however, most valuable, the solid opium or the bimeconate of morphia being preferred. It should always be given with caution; with belladonna as a suppository made with gelatin,— $\frac{1}{2}$ grain (0.032

gramme) of the extract of belladonna and $\frac{1}{2}$ grain or more of solid opium. Warm fomentations to a swollen abdomen often give comfort; when employed, they should be placed over the glycerin and belladonna application already mentioned. In a case of obstructed bowel from a supposed band, with mild symptoms, he has known relief to follow the elevation of the pelvis on a firm pillow, so as to allow gravity to act toward the thorax; and he believes that with this treatment, combined with starvation and the use of belladonna and opium, he has had cases of natural recovery. He claims no novelty in the treatment advocated; he only wants to enforce its value. The principle upon which it is based was first recommended by Sydenham; it was re-introduced by Brinton, and more recently enforced by Thomas, with some modifications. It may be summed up as follows: The recumbent position, with elevation of the pelvis; abstention from all food by the mouth; rectal alimentation; the external use of belladonna and glycerin; and the administration of belladonna and opium to check peristalsis and soothe pain.

Robert T. Morris, of New York, ¹⁹⁰³ recommends an aristol film for the prevention of secondary peritoneal adhesions. When, in abdominal surgery, we are obliged to separate extensive adhesions, there is always a dread that secondary adhesions will form shortly, and that the patient will continue to suffer from that source of trouble. The methods of smearing the surfaces of torn adhesions with oil, or filling the abdominal cavity with saline solution, are quite uncertain in the way of good results. He had noticed that when aristol had been dusted upon a wound it shortly formed a film with coagulated lymph, and it occurred to him that it might form a mechanical obstacle to the formation of secondary peritoneal adhesions. Accordingly, he utilized this measure in 4 patients, 2 of whom were suffering from constipation, amounting almost to intestinal obstruction, as a result of extensive adhesions which bound the colon firmly to other viscera. The other 2 patients were suffering simply from the constant discomfort of adhesions.

After separating all abnormally adherent peritoneal surfaces, he waited until oozing had almost ceased, and then sprinkled the fresh surfaces with aristol. After waiting for this to be held by lymph, he repeated the process, and, having formed a film of aristol and lymph over the region of adhesions, the abdomen was closed. His experience with the resource is limited to these 4

cases, and all of the patients say that the relief from former trouble is decided.

Tumors.—H. C. Scadding, of Toronto, Can.,⁸⁹ reported the case of a man aged 68, who was in January seized with acute pain of a “bursting” nature, referred to the region of the left nipple. This, which was thought to be angina pectoris, was relieved by the use of nitro-glycerin. In May he again sought advice, complaining of pain in the same region and in the stomach; no hæmatemesis or melæna; for this pepsin was given. He again appeared during August, and was found to have rapidly run down and to have lost a great deal of flesh. There was now found a tumor in the left anterior axillary line. Death ensued after two weeks of severe pain. Post-mortem examination revealed the fact that the omentum, the surface of the liver, under surface of the diaphragm, and the mesentery, were studded with nodules of new growth. The tumor found in the axillary line had involved the fourth, fifth, and sixth ribs, and projected, pushing the pleura before it. This tumor, which was found only two weeks before death, was no doubt secondary. The case was regarded as one of primary malignant growth of the peritoneum, for the peritoneal surface of the liver and of the diaphragm were covered by innumerable small growths, like a lot of cherries scattered over it. They did not in any way implicate the substance of the liver or of the diaphragm.

Retroperitoneal Tumors.—A. Vander Veer, of Albany,⁸⁹ in a report of 3 cases of retroperitoneal tumors, remarks that a careful study of the cases and of the literature of the subject impresses one with the belief that the most frequent origin of these growths is in the connective tissue of the capsule of the kidney, and that the next most frequent seat is the supra-renal capsule. None of these tumors can be said to be absolutely benign, even those which are made up entirely of histological elements, such as lipoma, fibroma, or myxoma. While they show no great tendency to recurrence after complete removal, yet, from the great size to which they develop and their tendency to undergo degenerative changes, they cannot be classed as innocent growths.

In many of the reported cases the origin is not stated; and indeed it would, from the subsequent changes in anatomical relations, seem quite impossible to determine the exact origin of many of the large retroperitoneal growths. They almost always present

themselves in the line of least resistance,—that is, anteriorly. A careful study of these tumors shows them to be of a mixed variety, containing both the elements of the lipoma and myxoma tissues, which are histologically very closely associated. Fat is developed from embryonal mucin, and in post-foetal life occupies those spaces in the economy which later in the foetus is of myxomatous elements. Doubtless many of these growths arise, under suitable conditions, from congenital neoplasms. The growths may become cystic and reach immense proportions. They often present a numerous round-cell infiltration, pointing to a sarcomatous element. Sarcoma, either in its typical form or in combination with other tissues, often occurs.

There is not a single symptom that is pathognomonic, and the diagnosis is more dependent upon the process of exclusion. Tumors of the other abdominal and pelvic organs, as well as aneurisms and tumors of the abdominal wall, must be excluded. As already stated, many of these tumors have their origin in the capsule of the kidney or the connective tissue surrounding it. These present, in their earlier stages at least, physical signs differing in no respect from tumors of the nephritic parenchyma. In none of the cases reported has renal hæmorrhage or albuminuria with or without casts occurred,—conditions which are the rule with tumors of the parenchyma of the kidney. A valuable adjunct in the diagnosis consists in noting the relation of the tumor to the intestinal tube, as shown by the insufflation of hydrogen gas.

Without operative interference there is but one termination, the rapidity with which the fatal result is reached varying with the character of the growth. The mean duration of life after the discovery of the tumor is about nine months. Operative treatment offers much promise. The immediate mortality of the operation is great, yet, from the hopelessness of the condition, it is to be urged with great earnestness.

In operations for the removal of retroperitoneal growths, the choice of incision will usually fall in the line of the linea semilunaris. By the separation of the peritoneum from the internal border of the tumor, it may be attached to the internal border of the abdominal wound, making the whole field of operation extra-peritoneal. The incision of the posterior fold of the peritoneum should be external to the attachment of the mesentery of the colon,

although not absolutely necessary. In the removal of the growth by enucleation, care should be taken to determine the source of the blood-supply and the relation of the great vessels. There are likely to be large, thin-walled veins deep in the wound, requiring ligature. At times it will be found necessary to remove the kidney with the tumor. As in abdominal work, the operator should be prepared for any and every complication. After enucleation, the cavity must be thoroughly drained. The after-treatment is the same as after other severe abdominal sections.

Like all other conditions in surgery, there is certainly a better understanding of these cases going on. A more correct and early diagnosis, as is the case in all that pertains to medicine and surgery, will surely bring a larger percentage of recoveries. These are purely surgical cases, no medicines, no mineral waters or baths, electricity, or other lines of therapeutics having as yet been of any service. To the paper was appended a complete bibliography of retroperitoneal new growths.

A case of supposed retroperitoneal sarcoma is described by Delafield, of New York.¹⁹_{May 20} A case of dermoid cyst of the peritoneum treated by laparotomy is reported by J. J. Buchanan, of Pittsburgh, Pa.,¹⁶¹_{Dec., '90} the paper including a brief review of the literature of the subject. A. Obalinsky⁵²⁰_{No. 20} also publishes a review of the literature of peritoneal dermoid cysts.

Enterectomy.—Kummer¹⁶⁹_{Aug.}; ¹⁰¹_{Sept.} finds that the chief fault of the ordinary suture of the intestine is its tendency to cause a stenosis, which may be followed by intestinal obstruction, perforation, or paralysis. To remedy this disadvantage, he has undertaken experiments on animals, and was led to adopt the following method: He dissects a cylindrical flap of mucous membrane, about one and one-half centimetres long, from the transverse section of the gut, and then unites mucous membrane with mucous membrane. The sero-muscular flaps are folded back in such manner that the serous margins are approximated, and sutured in this position. The sutures, which in the ordinary Lembert suture protrude into the gut, are placed on the outside of the intestine, and thus do not narrow the lumen.

Hofmohl⁴¹_{Jan. 19}; ²²⁴_{May 9} reports 2 interesting cases. Symptoms of incarceration developed in a young man, 24 years old, who had a bilateral hernia. These lasted ten days. Immediately after his

entrance into the hospital herniotomy was performed. When the sac was opened there was found a small amount of fluid and an intensely reddened diverticulum of small intestine, in which, on the convex side, was a perforation, about two centimetres in diameter. There was no gas or faecal matter. An artificial anus was established, and fourteen days later the operation of resection was done. A piece of the intestine, eight centimetres long, was excised. Union by first intention followed, with no further disturbance. The question that arises is, How did the loss of substance occur? No microscopical investigation has been made up to the present time, and hence the following seems to be the solution: It is possible that an erosion occurred at some point in the reddened, inflamed intestine, and the perforation occurred at this point from the energetic efforts of the patient at reposition. The second case was that of a woman who had been operated upon in 1886, by resection, for intestinal carcinoma, and who, in 1890 (October), experienced pains in the abdomen, symptoms of stenosis of the intestine, abdominal inflation, vomiting, and constipation. These indicated a second operation. Under the cicatrix of the first a small tumor could be felt. On opening the abdomen a small, walnut-sized tumor was found. The gut was decidedly stenosed at this point; and above it markedly dilated. In it was found a large number of foreign bodies, consisting of berries and cherry-stones. Eight centimetres of intestine were excised and examined microscopically. No trace of carcinoma was found, but a decided cicatricial stricture; nowhere ulceration. What was surprising, however, was the appearance of tubercles in the cicatricial tissue. Tuberculosis had occurred on the site of the former carcinoma. Otherwise, the woman showed no signs of phthisis. She does not cough, and is otherwise in good condition. No increased resistance can now be felt at the site of resection.

Holger Mygind, corresponding editor in Copenhagen, reports a resection of the small intestine for traumatic stricture by Studsgaard, ³⁷¹_{v.1, No. 18} of the same city. A man aged 37 had, six months previously, gotten a heavy blow on the right side of the abdomen, and had since then suffered from severe pains in that region. The pains appeared sometimes spontaneously, sometimes after hard work, and sometimes after he had eaten indigestible food, and were seldom accompanied by vomiting. Occasionally there appeared

simultaneously with the pains a palpable tumor on the injured place ; it appeared and disappeared again suddenly. The operation revealed a stricture, which only allowed a little finger to pass through, the walls of the intestine being here considerably swollen and rigid. In the serosa and subserosa were found granulation growths, which did not, under the microscope, exhibit any signs of being caused by malign neoplasm, but ought to have been considered as syphilitic granulations, though the author is mostly inclined to consider them as being of traumatic origin, as there were no other signs of syphilis. After the removal of a two-inch portion of the intestine and co-adjusting of the two ends, the intestine was replaced and the abdominal wound closed. Perfect recovery resulted, and the function of the bowels (which had previously been retarded very much) became normal.

Ileostomy.—Thos. Bryant, of London,⁶ considers that enterostomy has a weak point as an operative measure, and that is the uncertainty which the surgeon always feels as to the anatomical position of the coil of distended intestine which he may have opened, for Nélaton's directions were to open the coil of bowel which presented at the wound, which was made in the right iliac fossa. If the coil which presented happened to be low down in the ileum, all might be well ; but if it happened to be a coil of jejunum, failure must soon follow, for the patient would die of inanition. It follows, therefore, that some method is wanted by which the surgeon can be guided toward the lower part of the ileum.

The operation about to be described he called "ileostomy." The object was to open the ileum just above the ileo-cæcal valve ; for the working diagnosis made of the case was that of carcinoma of the cæcum. The operation determined upon was, therefore, on the lines of a lumbar colotomy for rectal stricture,—that is, it had for its object the formation of an artificial anus above the seat of the intestinal obstruction. He made an incision about one and a half to two inches in length in the right semi-lunar line, its centre corresponding with a horizontal line drawn across the abdomen from one anterior superior spinous process of the ileum to the other. Through this incision, when all bleeding had been arrested, he passed his index-finger, and, pushing aside a coil of distended small intestine, and coming down upon the inner border of the

cæcum, he at once hooked up the ileum and brought it to the surface. It is to be noted that the coil of small intestine which first presented itself was not the coil which was wanted. The bowel was very thick, and felt like a stomach. It had evidently, from overwork, become much hypertrophied. The bowel was then sutured to the parietal peritoneum by six fine, chromicised catgut sutures, three on each side, and care was observed not to pass the sutures deeper than the muscular layer of the intestine. Where the wound tailed off at either end a suture was passed through both edges of the divided parietal peritoneum, as well as through the muscular walls of the bowel itself. The outside wound was then brought together at both ends by a few sutures introduced through the skin and muscles of the opening. The bowel was not opened at the time of operation, but two guiding loops of silk were passed through the serous and muscular coats of the bowel, to indicate to the surgeon the exact position at which, later on, the opening into the bowel should be made. Without this aid great difficulty would have been experienced, and, consequently, danger, in completing the operation; for on the third day the whole surface of the wound, when exposed, was covered with granulations, and there would have been no guide whatever to indicate the point at which the puncture could with safety be made, whereas with the guide the completion of the operation was effected with certainty and precision. In an urgent case the bowel would have to be opened at once; the opening, however, need not be a large one, and Nélaton's directions to make it about a quarter of an inch long should be followed. At a later period the opening can easily be enlarged, and without pain, the bowel having no sensitive nerves. In his own case he made the opening about half an inch long.

For the first three days after the first stage of the operation was completed the patient's powers were kept going by means of small nutrient enemata, alternating with nutrient suppositories, administered every three hours, and a teaspoonful of brandy and water by the mouth every half-hour. A belladonna and opium suppository was given after the operation. After the bowel was opened and relief was afforded to the obstructed intestine food was ordered by the mouth, and was well retained. The patient was then, nearly five weeks after the operation, convalescent, and

her general condition had much improved. The bowel emptied itself without pain through the artificial anus as well as through the normal channel. This operation just described, and which for purposes of clearness may be called "ileostomy," is as applicable to examples of chronic obstruction of the cæcum from organic disease as is left lumbar colotomy for chronic obstruction of the rectum. It is, moreover, applicable to cases of acute or chronic ileo-cæcal intussusception in which, from some cause or other, the opportunity for opening the abdomen has been lost or the time for doing it has passed, and in which relief to symptoms is urgently called for. It will also, in practice, be doubtless found to be applicable to other cases when no other means of giving relief can be suggested. Should the lower end of the ileum in any given instance be found not to be the right coil to be opened, the most distended one which presents, as advised by Nélaton, may be taken as a substitute, and the operation turned into one of Nélaton's enterotomy cases. The operation is not a difficult one, and in extreme cases, where an anæsthetic is likely to be dangerous, it might be done even without its aid.

F. B. Jessett, of Brompton, ⁶_{Feb. 14} endeavors to demonstrate that, in order to place the patient in the best obtainable position during the remainder of his life, ileo-colostomy is preferable.

Cœliotomy.—Péan, of Paris, ¹⁰_{Dec. 20}; ¹⁰¹_{Feb.} reviews the treatment of stricture of the ileo-cæcal valve. His method of procedure in inflammatory stricture of the valve consists in making an incision of the abdominal wall, parallel with and four centimetres above Poupart's ligament, extending from the anterior superior spine of the ilium to the spine of the pubes. The tissues are then incised, layer by layer, down to the parietal peritoneum, which is then opened by a cut four centimetres in length. By this incision the cæcum and termination of the small intestine can be easily found. All hæmorrhage is carefully arrested. As soon as the ileo-cæcal valve has been found it is drawn forward, together with part of the cæcum and ileum. The intestine is then occluded above and below by rubber clamps, and an incision made in the gut over the ileo-cæcal valve, eight centimetres in length. After the intestine has been washed out any changes in the valve can be easily recognized. If fibrous thickening is present it can be removed, together with the affected mucous membrane, the muscular coat, however,

being left intact. The intestine is then closed by a double row of sutures, applied in such a manner that the wound, when sutured, has a transverse instead of a longitudinal shape. The clamps are removed, the intestine returned to the abdominal cavity, and the external wound closed in the usual manner.

This operation has been performed twice with success by Péan. It is only applicable to cases of inflammatory stricture of the ileo-cæcal valve, although it may also be employed in stenosis of other parts of the intestines. The author's conclusions are as follow: 1. The operation is easy. 2. It can be performed within a shorter time than circular resection, as fewer sutures need be inserted. 3. There is no danger of the formation of circular strictures after this operation, as in cases where resection has been performed. There is also less chance of a faecal fistula being developed, and rupture of the sutures is less likely to occur. 4. There is left at the place of stricture a dilatation which permits faeces to pass with ease.

A. W. Mayo Robson, of Leeds, ²_{Dec. 12, '90} applies the sutures in the ordinary way when performing cœliotomy, leaving the one which should bring together the abdominal walls where the drainage-tube passes untightened. The loose ends are knotted about four inches from the wound and left long, so that when the drainage-tube is taken out the knot may be cut off and the two ends tightened. This answers very well if the drainage-tube is removed within twenty-four or forty-eight hours, but if the tube be left in longer, as is so frequently the case, the sides of the aperture have become infiltrated with lymph, and the tightening of the suture is both painful and disadvantageous. The opening may be more conveniently closed by drawing the edges together with strapping, a few layers of gauze intervening between the wound and the strapping.

Colotomy.—Rose, of London, ⁶_{Jan. 21} reports 4 cases in which it was necessary to open the bowel and establish an artificial anus for the relief of symptoms due in 3 cases to the presence of new growth in the bowel and in a fourth for acquired communication between the rectum and bladder. In these cases the operation was performed through the wall of the abdomen,—a procedure which presented many advantages. Rose reviews the various methods having the same object in common—that of drawing the

loop of intestine well forward and preventing its retraction—that have been suggested. Maydl passes a hard-rubber cylinder covered with iodoform gauze through an opening in the mesentery close to the bowel. Lauenstein effects the same result by closing the abdominal wound by passing sutures through the mesocolon or mesentery, and secures the extremities of the loop by careful suturing. Allingham recommends a ligature passed through the mesocolon or posterior border of the gut; and Verneuil employs two large pins, and resects two-thirds of the wall of the bowel protruding from the wound. König does the operation in a manner similar to that of Verneuil, but empties and closes the lower end before attaching the upper one to the wound. Kelsey's method is somewhat like that of Verneuil. Cripps secures the bowel by making two-thirds of the circumference of the exposed part project beyond the opening.

To illustrate the procedure, the following case is given in full: A gamekeeper, aged sixty, was admitted under the care of Rose in January, 1890. A brother is said to have suffered from cancer of the lip. The patient stated that his health had always been good until about June, 1888, when he had a severe attack of diarrhoea and abdominal pains, the latter relieved by pressure, the attack lasting only a few days. Since then he had experienced general abdominal uneasiness and the passage at intervals of blood with his motions, the blood being bright red and clotted. No other definite symptom could be obtained. He complained on admission of dull, aching, abdominal pains, which were relieved by pressure of the hand firmly upon the abdomen; also of flatulence and weakness across the loins. The abdomen was distended and very resonant on percussion, especially over the region of the ascending and descending portions of the colon. Per rectum the finger could just reach an irregular constriction which encircled the gut, and the examination caused pain, which lasted for some time. He complained of severe pain during and after the passage of each stool, which was generally accompanied with much mucus and stained with blood. He passed six or seven loose motions a day. On February 8th inguinal colotomy was performed as follows:—

Taking an imaginary line from the umbilicus to the anterior superior iliac spine of the left side, an incision about four inches long was made at right angles to it and about half an inch exter-

nal to its centre. The abdominal wall, which was fairly free from fat, was then divided carefully, and the peritoneum opened to a corresponding extent. The small intestine presented at the wound and was pushed back. The omentum was now seen, and followed to the stomach; this in its turn was pushed back, and the transverse colon exposed and traced down to the descending colon and sigmoid flexure. A thread of catgut was then passed through one of its longitudinal bands at the spot selected for future fixation, and the whole returned into the abdominal cavity, the catgut acting as a guide. The parietal peritoneum was then stitched to the skin with a continuous fine catgut suture. The sigmoid flexure and lower part of the descending colon were then pulled out of the wound by gentle traction, the guiding thread indicating the required portion of the bowel. A long piece of thick catgut, threaded on a handled needle, slightly curved, was passed through the abdominal parietes about one inch from the outer edge of the centre of the wound, then through the mesocolon and abdominal parietes on the other side; the needle was then withdrawn, and the suture repassed parallel to and about one-third of an inch from the first in an exactly similar manner. The effect of tightening up and tying this suture was to bring into apposition broad surfaces of parietal peritoneum with the mesocolic visceral layers, thus bringing the abdominal parietes well behind the protruded colon, and effectually preventing its return to the abdominal cavity. About six inches of the gut were thus allowed to protrude. At the upper and lower angles of the wound a few additional fine catgut sutures were introduced, fixing the gut to the edge as an additional precaution, with a view to prevent further protrusion. The wound was then dressed, the bowel being covered with purified oil-silk protective, and the whole by the double cyanide gauze and salicylic wool. The patient still continued to pass loose, blood-stained motions per rectum until the sixth day, when the protruded colon was opened by a small incision; fæces were squeezed out, and the peristaltic action thus induced led to a copious evacuation. The patient passed no more stools per rectum, and was discharged, on March 1st, with his artificial aperture acting efficiently. There was little or no alteration in the condition of the growth to be detected on rectal examination.

Rose is convinced of the great advantage of the mesocolic or

mesosigmoid suture for the following reasons: The operation is simplified, less time is taken in its performance, the separation of the upper and lower openings is definite, and the tendency to retraction of the spur avoided, thus preventing the passage of fæces into the lower part of the gut,—one of the great troubles after such operations. The deep suture should not be removed until it is considered that the adhesions are sufficiently firm.

Israel,²²_{Aug. 20} in a case of axial twisting of the sigmoid flexure in a man aged 71, stitched a loop of the colon to the abdominal wound, in the fear that paralysis of the intestine would continue after the untwisting, and, as a matter of fact, although the bowels were open after the operation, three days later marked symptoms of paralysis set in, so that the intestine already stitched to the wound was opened. Complete recovery took place, the whole of the stools passing per anum.

Christopher Heath,²²_{July 1} did lumbar colotomy on the right side. The patient, a woman aged 64, had suffered from total obstruction for a fortnight, but had been sent to the hospital only on the day of the operation, the abdomen being enormously distended. As there had been but little vomiting, Heath thought the obstruction was somewhere in the large intestine, and by this diagnosis he decided to perform right colotomy, as the operation on the left side might bring him down either beyond or on the constricted part, either of which eventualities was to be avoided. The accuracy of the diagnosis was amply proved, for on opening the bowel a large quantity of liquid fæces was evacuated. Paul Reclus, of Paris,⁹⁰⁸_{v. 16, p. 104} states that, in France, lumbar colotomy has been almost completely abandoned in favor of the operation in the iliac region. In cases in which the urgency of the symptoms does not demand immediate interference with the intestinal contents the operation in two stages is recommended. The procedure of Maydl is the one preferred. Cocaine anæsthesia is employed, and the operation is completed in from six to ten minutes. The intestine is opened four to five days after the operation.

Interesting cases of colotomy are reported by Arch. Dixon, of Henderson, Ky.²⁰⁷_{Jan.}; Lutz, of St. Louis,⁸²_{July 11}; S. A. Smith and G. M. Fox, of Willenhall, Eng.⁶_{Aug. 3}; and B. W. White, of Bridgeport, Conn.¹⁹_{Sept. 12}

Circular Enterorrhaphy.—F. B. Robinson, of Toledo, Ohio,⁹⁶_{Feb.}

writes an elaborate study of the subject, based upon an extensive series of experiments on dogs, and introduces a new procedure. To illustrate the technique of the latter we will outline the different steps adopted in 1 case in point (out of at least 250 experiments): "After the usual preparations, a loop of small intestine was drawn out of a median incision and divided transversely. The proximal gut-end was scarified on its serous surface, and a rubber tube, four inches long and one-half inch in diameter, was stitched in it with a linen thread. Occasionally I put two stitches in the tube to hold it longer in its position. The distal bowel was denuded of its mucous membrane for three-fourths of an inch, by means of the scissors and curette. The proximal gut was then inserted into the distal gut-lumen. The circumference of the divided distal gut-end was sutured to the serous membrane of the proximal gut, one inch above its divided margin. A graft was then wrapped around the operated parts and fixed in position by sutures."

Robinson states that he has more than once seen the wrong tying of a thread kill a dog. A man is just as easily doomed. The evils to be avoided in this operation on the intestines are similar to those in any department of gastro-intestinal repair. They are (1) immediate and (2) remote. The immediate evil results are faecal fistulae, which invite the dreaded peritonitis to end the scene; the remote effects are strictures, or such narrowing of the channel of faecal circulation as to give rise to obstruction. He has many a time demonstrated that an artificial fistula made in intestinal anastomosis will contract and narrow from one-fifth to one-third, and even one-half of its original size, by the end of two months. These artificial fistulae are nearly always endowed with a distinctly sphincter-like condition. The edges or circumference of the sphincter are thickened, and are positively elastic. More experiments must be carried out to throw light on what will be the outcome of these fistulae and strictures. General experience shows that they gradually but progressively contract. The strictures from circular enterorrhaphy in his experiments have acted exactly like artificial fistulae, but the experiments seemed to demonstrate that stricture from circular enterorrhaphy was more apt to occur, and also more apt to contract into dangerous obstruction. This is, no doubt, due, in a measure, to the difference of the

longitudinal and circular muscular fibres of the gut. The experiments on animals positively show that peritoneal plastic exudates are indefinite as to time and quantity. The exudates may be produced in a few hours, or be delayed more than a day. Hence, a good graft is required, and such plates for anastomoses as will last four to six days, *e.g.*, the segmented rubber or rawhide plates, can be made to absorb at will, as regards time.

In a large number of experiments the results were marred by invagination. A number of animals were lost after operations on the intestines which, if the invagination had not occurred, would not have died. This induced him to study how to avoid the accident. After considerable experimenting, he found that rubber tubing was a definite aid in preventing invagination. At first he used rubber tubes from one to two inches long, but they did not entirely prevent the accident; so, finally, he adopted rubber tubes three to four and even six inches long. He never had any deaths from invagination after that. But the main portion of the tube should project above the seat of operation on the proximal side. The tube should remain in position for four to six days. He never saw any obstruction, either while the tube was in position or after it had become disengaged from its position. Obstruction and operative procedures are generally accompanied by fluid fæces at the seat of disturbance, so that the fluid fæces would easily pass through the tube. The tube should not be too large in diameter, or it may cause gangrene and fistula by its pressure, but it should be thick enough to keep the gut-walls patent and hold in continuous approximation the healing surfaces. He found the tube advantageous in all forms of circular enterorrhaphy and in Jobert's operation. The threads were absorbed or worked their way gradually into the bowel-lumen. If one bowel-lumen is considerably larger than another, in performing the above operation the larger lumen could be narrowed by V-shaped incisions, but under such circumstances the intestinal anastomosis by segmented rubber plates or rawhide plates is safer.

F. T. Paul, of Liverpool,^{6 187 22}_{May 30; July; July 29} also describes a new method of performing enterorrhaphy. The object in view was to extend the principles involved in Senn's operation of lateral apposition with decalcified bone-plates to a direct and continuous reunion of the severed bowel. Paul remarks that end-to-end is preferable to lateral reunion, if it can be obtained with equal

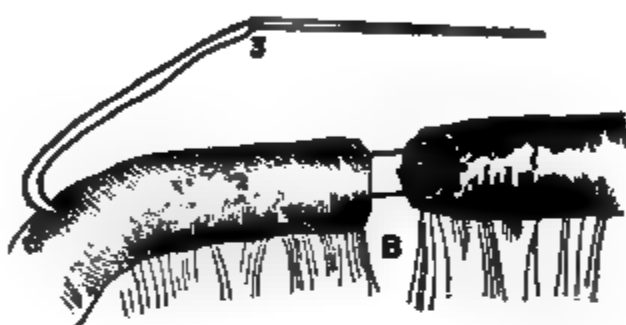
safety, and that Senn shares this opinion is sufficiently indicated by his offering an alternative operation of this nature, though decidedly more fatal in its immediate results. The method under notice is, he believes, less dangerous than either of Senn's, for it has not by itself been fatal in any dog operated upon. The operation is not suggested to replace the bone-plate method in any of those cases for which it is specially suitable, such as pyloric obstruction where lateral apposition is necessary, or in matting of the intestines with obstruction, when it is certainly advisable, but rather to replace previous methods of end-to-end union by invagination of the proximal into the distal portion of the bowel. There can be no question that the bone-plate operation has proved a very marked success. In his experiments he resolved that decalcified bone should be the supporting material, and he has had every reason to be satisfied with it. He had a number of bone tubes made, about one inch long and suitable for the calibre of dogs' intestines. These were prepared in accordance with Senn's directions. Altogether, 11 experiments were made. Of these, the operation described was performed in 8 consecutive cases. Four were allowed to live for long periods, and 4 were killed at early dates; but none were injuriously affected by the operation. The other 3 were operations of a different nature, and were all fatal. Of these, the first involved a partial resection of the coats of the bowel, which was followed by sloughing and perforation. The second was an experiment to ascertain the danger of cutting away the mesentery from the colon, in view of the obstruction offered by the human mesocolon to invagination of that portion of bowel. The mesentery was cut from three inches of colon in the dog, saving the vascular connections as much as possible, and an enterorrhaphy done at the spot. Gangrene ensued, and was fatal in about thirty-six hours. In the third case the ileum was connected with the rectum, the colon being cut off from cæcum to rectum, and invaginated at each end. Fæcal matter contained in the isolated colon was forced by peristaltic action to the lower end, where it formed a small, round ball, and burst open the Lembert sutures, thus liberating the invagination. The sutures in the mucous membrane held, but permitted the exudation of a little fluid from the intestine into the peritoneal cavity. This was rapidly fatal, for the dog was left well on the second night, and

had been dead some hours when seen next morning. The attachment of the ileum to the rectum was going on quite satisfactorily.

The operation is now performed in the following manner: The bowel being ready to receive the tube, its full length is intro-

duced into the proximal end, the cut margin of which is sewn to the tube through the perforations with a fine, continuous, chromic-gut suture (B). For this purpose a sewing-needle is used, which in passing is made to dip more deeply into the mucous than the peritoneal coat. It is not sufficient to take the muscular and mucous coats only, as the attachment to the tube is not then sufficiently secure. When sewing the mesenteric border of the bowel to the tube, care should be taken to pick up the severed edges of the mesentery with the point of the needle, as this is the part most likely to give way, and the mesentery should not be allowed to drag in the least degree from the cut edge of the bowel. Next, the needle of the traction-thread is slipped along a director, about three inches down the distal segment of the bowel, and pushed through its wall. Then the distal is

sewn to the proximal end by a chromic-gut suture all around, the needle piercing the musculo-serous coats only. Again, great care is taken to fix the mesenteric edge securely, and with the same thread the opening in the mesentery is drawn together. Now, an assistant takes the traction-threads, and steadily resists the operator as he draws the distal end of the bowel back over the



CIRCULAR ENTERORRHAPHY.

A, the decalcified bone tube. 1, the lower or distal end perforated for sewing to the bowel. 2, the traction thread armed with long sewing-needle; 3, its attachment to the tube. B, a stage in the operation. 1, the proximal end of the bowel with the tube sewn in. 2, the distal end not yet sewn to the proximal end, but with the traction thread (3) passed. C, the operation completed. 1, the sheath or intussusception of the invagination. 2, the Lembert sutures for retaining the parts in position. D, the parts dissected. 1, the tube in situ; 2, the traction thread cut short; 3, the proximal end of bowel entering the intussusception; 4, the distal end supplying the returning and anastomosing layers.

(*Liverpool Medico-Chirurgical Journal.*)

tube, thus invaginating the proximal end and producing the appearance seen in figure C. The parts are retained in position by a few Lembert sutures, one on either side of the mesentery and others as they appear necessary. Lastly, the traction-thread is pulled tight and cut off short, the small opening caused by it requiring no further attention. The operation is completed by cleansing the intestine and closing the abdomen in the usual way. The special part of the operation may be said to involve three stages: (1) to introduce the bone tube into the upper or proximal end of the bowel, and sew it there; (2) to pass the traction-thread and attach the distal and proximal ends together; (3) to produce the invagination, retain it in position by a few Lembert sutures, and cut off the traction-thread. With no unusual difficulty, each stage ought only to occupy a few minutes. He operated in this way upon 6 more dogs, and they all did remarkably well.

Appendicitis.—Notwithstanding the hybrid philological construction of the term “appendicitis,” suggested by Fitz, of Boston, who claimed that every case of so-called perityphlitic abscess must be regarded as primarily one of perforative appendicitis unless proved to be the contrary,—typhlitis, perityphlitis, paratyphlitis, cæcites, typhlitic abscess, perityphlitic abscess, etc., besides the host of terms suggested of late,—“appendicitis” has about supplanted its rivals. It is rather interesting to note, however, that although the vermiform appendix is almost always the seat of the primary trouble,—99 per cent., says McBurney,—the “almost” denotes a flaw which tends to indicate that “appendicitis” is rapidly gaining favor owing to its advantages as a shield for our present ignorance. Our knowledge of the pathology of this class of cases will have to reach a higher level before proper subdivisions can be thought of. “Appendicitis” will do—for a while, at least.

A very interesting discussion took place early in the year, at a meeting of the London Clinical Society,^{22 Feb. 18} on the subject of surgical interference in appendicitis. The evening was devoted to a discussion upon a series of such cases, in many of which the operators seemed justified in believing that without their interference the results would have been fatal. A feature of the debate was the fact that the chief person to protest against what he called the “epidemic” appendicitis was Treves, who, however, can hardly

be credited with a lack of audacity crowned by success in the past. In spite of the brilliant results obtained, he "regretted the time when too little, rather than too much, was done in these cases." His forebodings contrasted strangely with the sanguine views of the physicians present, who joined in congratulating surgeons upon having succeeded in saving life in cases which they were frank enough to admit were formerly often left to their fate. Duckworth was of the opinion that "delay is little short of criminal." In a note published a few days later, Treves⁶ explains his meaning more fully in the following words:—

"My list of cases is not small, nor have the results been unsatisfactory. What, however, I wish to protest against is the quiet assumption that all cases of typhlitis, and even those which are distinctly acute, demand surgical treatment, and that in the majority of instances at least medical measures avail little. I have shown elsewhere that the majority of examples of what is known as acute typhlitis end in recovery under simple medical treatment, and that a surgical handling of the trouble is only called for in a comparatively few selected cases, and that even in these it is possible to clamor for a too early operation. There are cases of appendicitis and cases of relapsing typhlitis which get well without the surgeon's aid, and I would urge that more discrimination should be exercised in selecting the cases which are suited for operation. The almost reckless and injudicious manner in which, to judge from published and private reports, the appendix is being excised at the present day, is doing a great deal to bring the operation into discredit, and to direct an adverse criticism against what is, in suitable cases, a most valuable and, indeed, indispensable measure. It would appear to be rather among American than among English surgeons that this epidemic is raging."

Such a protest as this from a surgeon like Treves, who combines boldness as an operator with sound surgical judgment, and whose experience in cases of appending disease is probably equal to that of any one in Great Britain, should have great weight.

It is apparent that the gentlemen who have brought the methods of their genito-urinary cases up to an arbitrary standard by dividing their normal constrictions, who have performed "radical cures" on all their hernia cases, who have removed the ovaries of the majority of their nervous female patients, who have done linear

craniotomy on their microcephalic idiots, and have tapped the ventricles of those who were hydrocephalic, are occupying themselves largely with the appendix.

It is not contended, of course, that these operations have no proper place in surgery, unless that statement applies to the last two, and even these may, as time goes on, be found of some value in rare instances; but it is to their indiscriminate application and their reckless employment in unsuitable cases that objection is made, and I have no doubt will continue to be made with increasing force as the sound, common sense which always governs general professional opinion makes its influence felt.

Treves's position is a sound one; his statements need not interfere with operation in a single appropriate case; they may save a number of individuals from premature operations in appendicitis, and from the unnecessary removal of the appendix during health.

H. W. Rand, of Brooklyn, ¹⁵⁷_{Mar.} also enters a plea against promiscuous early operating. He states that, although a large majority of the patients submitted to early operation have recovered, a study of their histories will convince one that these good results do not prove the necessity for such prompt interference in all cases of appendicitis, even of those with fairly well-marked symptoms; for in some of these patients nothing more serious has been found than a mild or moderately severe catarrhal inflammation of the appendix, and the experience of numerous observers has shown that a considerable proportion of similar cases make good and permanent recoveries without any operation whatever.

Lange, of New York, ¹_{July}, in the course of a discussion at the New York Academy of Medicine, made a warm protest against the practice of indiscriminate laparotomy for appendicitis. This class of operations included four-fifths of the superfluous laparotomies, since it was a fact that in a very large majority the patients would recover after simple incision at a somewhat later stage. It was only a small minority of cases which required early laparotomy, and to distinguish those was the task now before the profession. In answering this protest, Stimson, of New York, said that none of those who were in favor of the early operation advised that it should be resorted to in every case. They were not, however, in favor of waiting for the formation of an abscess, for peritonitis, or for sepsis. Fitz's statistics showed a mortality of 25 per cent.

under the expectant treatment; that of the early operation was perhaps not yet established, but McBurney had reported 24 cases with only 1 death,—a saving, according to the statistics, of 5 lives.

There is no doubt, as has been said, that the field offered by this class of operations, especially for young surgeons, has proved a great tempter; but, fortunately, there are many conditions present to act as a brake for their ardor. The dangers of a laparotomy and the responsibility assumed are often more inclined to deter than to encourage, while the influence of the patient's friends forms a barricade which even renowned surgeons find it at times impossible to overcome, in suitable cases, to the sufferer's great detriment. A marked instance of this kind is related by McBurney.¹ Mar. 23 He had been called to see a lady, residing out of the city,—a healthy-looking, vigorous woman of about 36,—on a Saturday. The patient gave the history of having been seized with a sharp abdominal pain on the preceding Wednesday. The symptoms had persisted, and had been such as to call for the diagnosis of appendicitis from her attending physicians. The speaker found the local signs such as to warrant him in urging immediate operation, especially as the general condition of the patient was all that could be desired at the time. For some reason the patient's friends concluded to wait, and, much to McBurney's regret, he had to return to the city without operating. Thirty-six hours subsequently he received a dispatch, begging him to come and operate immediately. He found the patient presenting all the appearances of intense sepsis. The local condition seemed unchanged, and there was no indication of the existence of abscess, except that the tumor was partially concealed by the increased tympanites. There was also diminished sensitiveness. Of course, the case was hopeless. The patient could not have survived the administration of an anæsthetic. By great efforts she was kept alive for six days, though there never was a moment during that period when an operation would have been admissible. An autopsy was made at the request of the friends, who, he thought, were somewhat hopeful that the diagnosis had been a mistake.

Per contra, the following case indicates the advantages of early interference: Murray, of New York, July 4¹ saw a boy, 11 years of age, who had presented the usual typical symptoms, though not of a severe type. Still, it was considered as one in which it would

be more prudent to operate, and accordingly, some forty hours after the initial symptoms, the speaker had operated. The appendix was in a marked gangrenous condition; it lay downward and inward, hanging in the true pelvis, and was immensely distended. There were no adhesions, excepting a few on the inner half of its base, where the omentum was slightly adherent. The entire base was gangrenous, and part of the adjacent mesentery, and near the tip of the appendix there was a faecal concretion. On section, after removal, the entire lining of the appendix was found gangrenous, and near the tip of the process, over a small area, all the coats excepting the serous had sloughed away. The appendix contained 1 ounce (31 grammes) of foul, dark-colored fluid, and it was only a question of a few hours before there would have been perforation and emptying of its contents into the peritoneal cavity. The absence of adhesions and the position of the appendix confirmed such an opinion.

Reclus's (of Paris) views ⁹¹_{No. 10, 90}; ¹⁵⁷_{Oct.} as to the necessity for early operative interference in perforative appendicitis are positive and unqualified. He asserts that, the diagnosis once having been made, surgical interference cannot be brought too early into the case. This is particularly true if the course of the case has been such as to justify the belief that no limiting adhesions have occurred to shut off the peritoneal cavity from the point of perforation. The double object of cure of the original disease, and in addition the prevention of general peritonitis, make more than desirable—in fact, imperatively necessary—immediate abdominal section. Should the inflammatory process be strictly localized in the right iliac fossa, such great urgency need not necessarily be present; but it should be borne in mind that the suppuration process in these cases extends with extraordinary rapidity, and the prognosis be thereby rendered very unfavorable. At about the fourth day following the attack of perforative appendicitis solid adhesions are to be expected between the abscess-cavity and the abdominal wall. Roux, of Lausanne, ¹⁹⁷_{Nov. 20} who lives in a country where appendicitis is extremely prevalent, advises his colleagues not to allow themselves to be intimidated by chimerical diagnostic and operative difficulties, and to proceed at once themselves when abscess is determined. His extensive experience in these cases will soon be published entire, a portion of his paper having already appeared. ¹⁹⁷_{Nov. 9, 10, 11}

W. J. Cruikshank, of Brooklyn ¹⁵⁷₇₇ (a physician), among conclusions presented at the end of an interesting paper, stated his opinion that the vast majority of the cases seriously endanger life, and that, therefore, all cases should be considered with a view to early surgical interference. As we have no means of distinguishing those cases which will go on to the formation of an abscess without accident from those which will result in resolution, early laparotomy should be resorted to in doubtful cases, in order that by ocular inspection of the parts a correct diagnosis may be made. If at the end of twenty-four or forty-eight hours there are evidences of advancing disease, surgical interference should be resorted to in all cases.

R. Winslow, of Baltimore, ⁸¹₈₄ says that when there is severe localized pain, tenderness, and a tumor present in the right iliac region, with the constitutional symptoms of suppurative inflammation, an early operation is demanded to evacuate the pus. This should be done as early as the third day when possible. He considers delay more dangerous than operation; the adhesions circumscribing the pus may give way and a rapidly fatal peritonitis may be set up.

G. R. Fowler, of Brooklyn, ¹⁵⁷₈₄ in a study of 28 cases of his own, in 1 of which early operation was indicated and refused, and in which death occurred, while in others good results followed operative interference (some of these being denominated of the mild type, which would ordinarily have been relegated to purely medical treatment, and in which the operation disclosed a most desperate condition of affairs), believes that early operative interference is indicated. In the majority of cases this will reveal conditions which fully justify the procedure. The cases in which recovery ensues after the disease is well under way are exceedingly rare. In his judgment the surgeon would be justified in opening the abdominal cavity and making an exploration of the right iliac fossa in doubtful cases, determining, as a result of that exploration, whether or not further interference be indicated.

The value of such teaching as that of Cruikshank and Fowler depends entirely upon the interpretation put upon the word "early." It should never be forgotten, however, that the exploratory opening and "ocular inspection" may be a very fatal procedure by breaking up the adhesions isolating the inflammatory or suppura-

tive focus from the general peritoneal cavity. To teach dogmatically and as a matter of routine that "if at the end of twenty-four or forty-eight hours there are evidences of advancing disease surgical interference should be resorted to in all cases" would be distinctly to increase the mortality of appendicitis. There are cases in which even earlier interference is justifiable; delay is rarely or never advisable in the presence of symptoms warranting a diagnosis of general peritonitis, although such cases are usually fatal whether they are operated upon or not; the absence of a distinct tumor in the iliac fossa, with constitutional symptoms of suppurative inflammation and of peritoneal infection would contra-indicate delay, but such cases must be carefully classified. General statements such as those quoted above are misleading and harmful.

A. Vander Veer, of Albany, ²⁰¹⁹ in a paper on the relation of the physician and the surgeon in the care of cases, concludes that, when called, the responsibility rests largely with the surgeon to further aid or decide as to diagnosis, and as to the necessity of immediate operation. If it is once decided to operate, then the technique of the operation and the care of the case for a certain period devolves entirely upon the operating surgeon. It must be remembered that these cases often occur among a class of people where the anxiety is of the greatest, therefore the physician and surgeon should join their efforts early in the case. He thinks also that at no time after the operating surgeon is called in and operates should the physician and he be separated in their care of the case. This mutual care must consist in a closer watching of early symptoms by the physician; of a greater degree of confidence in the skill of operating surgeons. The care as between physician and surgeon must be brought to that plane where we shall meet with fewer cases of septic condition when operating, and where the symptoms of collapse, such as cold hands and feet, husky voice, subnormal temperature, and like conditions, have not been reached.

Diagnosis of Appendicitis.—L. Revilliod, of Geneva, Switzerland, ¹⁸⁹⁷ dilated on the difficulty in establishing a differential diagnosis, and called attention to the signs furnished by examination of the urine. If the affection present is one belonging to the territory of the portal vein the urates will be found greatly increased. If, on the contrary, the affected organs are within the

regions that are tributary to the vena cava, no increase in the urates will be observed. The facts were brought to light, he says, in the theses of Darier and Soboleski.

Joseph Price, of Philadelphia,¹⁷⁰ gives an outline of the most constant and valuable signs, based on a study of the literature of the subject, as follows: 1. History of sudden onset. 2. The point of greatest sensitiveness to pressure exactly localized over the base of the appendix. 3. Fever, as indicated by the thermometer, varies; usually low. 4. Rigidity of right abdominal muscles constant. 5. Constipation. 6. Œdema, overlying a deep abscess, in the right iliac fossa in neglected cases. 7. Shock, more or less profound, usually occurs where perforation happens early and suddenly; it is followed by chill, vomiting, and collapse. There are no special signs of perforation if it takes place late, after adhesions have formed. If perforation occurs late, and the adhesions are imperfect, we find shock. The symptoms should be studied most carefully at the end of the first twenty-four hours. 8. Pain is misleading; often referred to epigastrium alone; to umbilical region sometimes; it is often slight. 9. Tympanites is variable; it depends on the state of the bowels; it indicates intestinal paresis; if it comes on rapidly it is unfavorable; it is often the result of opium. 10. Percussion not necessarily dull; there may be a tympanitic note from gas in an overlying intestine. 11. Overextension of right thigh gives pain. 12. Cough is avoided. 13. Tumor inconstant the first two days. 14. Pulse indicates severity and increase; it shows constitutional disturbance. 15. Chill and vomiting inconstantly accompany the initial pain. 16. A prodromal stage of abdominal discomfort (about a week) is frequent. 17. Flexion of hip-joint not marked except in neglected cases. The symptoms are not commensurate with the gravity, intensity, or fatality of the disease.

Early diagnosis is of the greatest importance in reference to treatment and result. 1. Find with tip of finger—using firm pressure—point of sensitiveness (exact point of greatest sensitiveness); it will be, in an adult, one and a half to two inches inside the right anterior superior spinous process of the ilium, on a line drawn from that process to the umbilicus; in children, according to size, less distant from the spine of the ilium (McBurney, confirmed by Weir and others, but which Price¹⁷⁰ considers “ununiform and

worthless"). 2. Rectal examination is of no value early. 3. Difficult to diagnosticate the first twenty-four hours, because few symptoms are present. 4. Subjective pain is of little or no value. 5. Constitutional symptoms are far inferior to local signs in forming an accurate diagnosis. 6. Have patient cough. 7. The hypodermatic needle should never be used as an aid to diagnosis. 8. Medical men (physicians) no longer diagnosticate these cases—in the start—as simple obstruction of the bowel. 9. Diagnosis by exclusion is the only safe method. 10. The important point—after the disease has been pronounced appendicitis—is to diagnosticate it as an operative or a non-operative case.

Richard H. Gibbons, of Scranton, Pa., ¹_{Apr. 18} considers that the importance attached to the "McBurney point" is misleading, and that much more emphasis is generally placed upon its value than McBurney himself does. He quotes Hodgman's case, ¹_{Nov. 15, '90} in which it was said that "The McBurney point was exceedingly tender,—far more so than any other spot on the abdomen. *The left side was also tender at a point corresponding to the McBurney on the right, yet to not nearly the same extent as the latter.*" (Italics are Gibbons's.) Hodgman further added that an operation for the removal of a probably diseased appendix was performed, that the appendix was found to be healthy, but that he removed a large quantity of pus from the abdominal and pelvic cavities. His patient, unfortunately, was in a hopeless condition before the operation was begun, and death soon followed. On post-mortem examination "the cause of the peritonitis became apparent in that the right ovary had been the seat of a large abscess that had burst into the peritoneal cavity," the nearest approach to appendicitis being the statement that "the ovary was lying directly underneath the caput coli." He also alludes to a case by Smith, ⁵⁹_{Apr. 11} who made the statement that "McBurney's point was very well marked," and this fact, coupled with other symptoms, prompted him to refer the case from the medical side of the hospital where it was seen to the surgical division "for operation for appendicitis." Here "some delay took place before the operation could be done," during which time other symptoms presented themselves that led to exploratory puncture and incision, revealing the fact that all the symptoms were due to rupture of the kidney. When Smith reported this case he said that the patient "was doing well." He further adds:

"It was only on account of the delay, during which the physical signs changed, that an operation was not done for appendicitis."

William Pepper, of Philadelphia,¹⁷⁰_{Dec., 70} at a meeting of the Philadelphia County Medical Society, expressed his opinion that the question of diagnosis remains, in spite of all the good work that has been done, a most difficult one. The McBurney point he believes to be largely without value, uncertain in its location on account of the very varying relations of the appendix, apt to be mistaken for points of tenderness due to wholly different causes, and apt possibly to be mistaken for sympathetic tenderness of nerve-points in the abdominal wall. He, therefore, thinks that this sign, from which much was hoped, will prove to have very little positive diagnostic value. The same opinion was expressed by Thomas Bryant, of London, who was present at the meeting.

Pathology of Appendicitis.—H. Einhorn³⁴_{Nov. 7, 8} publishes the following conclusions, based on the records of 100 post-mortem examinations in cases of peritonitis from perforation of the appendix vermiformis (out of 18,000 autopsies of miscellaneous dead) made in the Munich Pathological Institute from 1854 to 1889: (1) perityphlitis, in 91 per cent. of the cases, is the result of disease of the vermiform process; (2) primary perforation of the cæcum occurs in only 9 per cent. of the cases; (3) notwithstanding the unanimous statements of all previous observers to the contrary, typhlitis and perityphlitis occur with like frequency in both sexes; (4) predisposition to these lesions occurs only in advanced age, not, as has generally been assumed, in youth; (5) perforation of the vermiform process is very seldom caused by the presence of a foreign body, and in such instances usually by hardened and inspissated masses of faecal matter; (6) perforation is favored by deviations from the normal form and position of the vermiform process, and also by diseases of its mucous and muscular coats,—due, in many instances, to an unhealthy condition of the intestinal contents; (7) typhlitis and perityphlitis are caused much more frequently through injury. W. F. Whitney, of Boston,⁹⁹_{July 30} read a paper before the Boston Society for Medical Improvement, in which he laid special stress upon the presence of cæcal concretions, the importance of which he thinks is rather greater than is usually recognized.

Herman Mynter, of Buffalo,⁶⁹_{Apr.} thinks that the affection may find its start either in the cæcum or in the appendix, but with

marked predilection for the latter. Catarrh of the cæcum with dilatation he considers quite frequent, and it is probably followed with catarrh and dilatation of the appendix and its opening into the cæcum,—“Gerlach’s valve,”—so that the contents of the bowels enter with greater ease. The appendix has a relatively large absorbent surface, so that the fluid is absorbed, while the solid parts are left and form concretions, which again probably are the mechanical causes of inflammation, ulceration, and relapses.

Prognosis of Appendicitis.—Joseph Price, in the general review already quoted, page 81, says that no positive prognosis can usually be given in the first twelve hours. If we wait for “strong evidence” of perforation, abscess, general peritonitis, rapid and weak pulse, anxious respiration, distension of abdomen, though the operation is made, the patient will not recover. Surgery has sometimes been successful even where there has been (a) general suppurative peritonitis; (b) septic paresis of the intestines; (c) multiple abscesses in the peritoneal cavity. Such cases as these, however, usually die, and are classed as hopeless. Where there is no exhaustion, no general sepsis, no debility from long abstinence from food, no prolonged vomiting, the prognosis is good. “Abscess, wherever it is, and however well it may appear to be surrounded by protecting plastic deposits, is a constant menace to life, as evidenced abundantly by its spontaneous opening into the abdominal cavity, the venous canals, the bladder, and the chest-cavity, as well as externally and into the intestinal canal.” (Bridge.) Pus will form whether there be perforations or none. Sepsis is hopeless for medicine, and nearly hopeless for surgery. Sepsis begins before the end of the third day, as a rule. Death from sepsis on the third, fourth, and fifth day is the rule. The prognosis as to day of death, without operation, in perforative cases is: one-third die between the second and fifth day. Proof of 176 cases: 8 cases died on the second day; 28 cases died in first three days; 46 cases died in first four days; 60 cases died in first five days. (Fitz.) Experience shows no danger existing of infecting the healthy peritoneum in the course of an operation on the appendix.

Treatment of Appendicitis. — The subject of treatment of appendicitis was thoroughly discussed at the one hundred and tenth annual meeting of the Massachusetts Society, ⁹⁹ July 9, 18, 22 the dis-

cussion being opened by J. C. Warren. From a general review of his experience, D. W. Cheever concludes that the first twenty-four hours of medical treatment are those essential to preventing perforation, if inflammation has begun; or to promote the formation of adhesions, if perforation has taken place. This treatment is recumbency; strict diet; moist heat, incessantly applied; opium. If the vital resistance of the patient is good, we have prompt adhesions and a wall of lymph. If no encysting takes place promptly, we have a fatal diffusion. The presence of a recent tumor is a strong corroborative sign of appendicitis, but not a certain one. The absence of a tumor is an assurance of great danger if the symptoms are acute. It is impossible to drain the peritoneal cavity. In R. H. Fitz's opinion, it is desirable to wait for three or four days at least after the onset of the symptoms, in order to watch the progress of the case, for the purpose of deciding whether it will recover under medical treatment or whether it will demand surgical treatment. This waiting is not only suggested by the experience in acute cases, but it is confirmed by those cases of chronic appendicitis in which the patient has localized disturbances for months and months. Every now and then there will be an acute exacerbation, often keeping him in bed for a few days. These, however, are the cases which are much better operated upon, if they are to be treated surgically, in the interval between the attacks than at the onset of an acute attack. J. Homans classifies the varieties of appendicitis, as regards surgical treatment, as follows: 1. One in which the appendix is perforated, and perhaps the cæcum also, and general peritonitis is at once set up. This class of cases is generally fatal, with or without operation. 2. Another variety has perforation of the appendix, with limited peritonitis, soon shut off in an abscess of varying size, but generally rather large, and forming a well-defined tumor, often quite prominent. This class demands operation and drainage, and is generally cured. 3. A third variety has the appendix swollen and œdematous, but unperforated; and yet the symptoms are severe, and there is great anxiety and often distension. The tumor here is ill-defined and small, but there is considerable tenderness, with high temperature, pulse, and abdominal distension. With no improvement in three or four days, laparotomy—and removal of the appendix, if easily found—is proper. 4. The fourth variety has a sharp pain at first,

soon subsiding; perhaps one attack of vomiting, a tenderness on pressure, and a swelling in the right iliac region, and without any tumor in the rectum. These cases resume an almost normal temperature and pulse in a few days, and, though the convalescence often lasts from four to five weeks, yet health is finally restored. The liability to subsequent attacks, however, is problematical, but operation in the initial attack is improper.

C. B. Porter, after a very interesting address, said: "If you are in doubt whether to operate or not I believe that the proper thing is to operate, and that it is a good deal better to give the patient the benefit of the doubt than to take it yourself." Worcester, of Waltham; Weeks, of Portland, and Gordon, of Portland, also took part in the discussion, which merits careful reading, many cases being reported.

Charles McBurney, of New York, ⁹⁸_{Am.} in a paper in which he reports 24 cases, says that by early laparotomy he means operation before the pathological process has reached a very advanced stage. This cannot be measured by time. In some the rapidity of the process is very marked, in others very slow. Some patients ask for attendance on the first day, and some not until the third or fourth day. He includes in his list of cases *all* of those treated by early operation in hospital and private practice before general septic peritonitis had begun, before pus had flowed freely down into the pelvis, or before complete septic paresis of the intestines had set in. These conditions are frequently fatal even with operation, and he has had to operate upon a number of such, and without success, although in some of these the operation was done at an early period as regards time, but at a too late one so far as the development of the disease and the surgical indications were concerned. W. W. Keen, of Philadelphia, ⁹⁸_{Am.} formulates the general rule that by the second, certainly by the third day, and *a fortiori* later, the operation should be done if the following indications are present: (1) if there is abdominal pain, most marked in the right iliac fossa, and especially with tenderness at McBurney's point, attended possibly with nausea and vomiting; (2) if there is rigidity of the right abdominal wall; (3) if there is fever up to 100° F. (37.8° C.), 101° F. (38.3° C.), or 102° F. (38.9° C.), which does not yield to medical treatment; (4) if by minute and careful palpation tumefaction and increased resistance can be discovered, with possible

dullness and, rarely, fluctuation; and (5) if there is œdema of the abdominal wall. Pus will generally be found, but it is possible that there may be none. If pus is present the abscess-cavity is to be evacuated and washed out with great care, lest its frail wall be broken down and general peritonitis ensue. If there be no pus the appendix should be sought, and, if it is swollen, thickened, distended, the seat of a concretion, or otherwise abnormal, even without perforation, it should be tied and cut off, and the stump either be simply disinfected or inverted and covered by a few Lembert stitches through the outer layers of cæcum. The brilliant results which have been reported by Senn, Treves, McBurney, Stimson, Bernardy, Baldy, and others, in cases in which no pus was present, but the appendix was perilously diseased, have abundantly shown that such an appendix is a menace to life compared with which the dangers of an aseptic operation are nothing. Moreover, he would be decidedly in favor of an operation, even if there were present only iliac pain, tenderness at McBurney's point, rigidity of the abdominal wall, moderate fever, and increased resistance without tumefaction and dullness, nausea and vomiting. The unusually large personal experience of Fitz shows that five-eighths of all cases, and one-fourth of the cases which had been treated medically alone, should have been operated on. With so large an experience from so careful and accomplished an observer, it is a crime for us to go on allowing case after case to die that ought to have been relieved by surgical interference.

Körte, of Berlin,⁸⁸ says that it is in the diffuse, suppurative, progressive forms that the surgeon is able to save life, as Mikulicz has shown. His experience has certainly differed remarkably from that of other operating surgeons; but he is probably generalizing from too limited a number of cases, as this paper shows. He reports 3 such cases, with 1 death; the operation in the fatal case was performed *in extremis*, at the urgent request of the patient. At the autopsy it was found that recovery in this case might have been possible, for both the abscesses which had been opened were found completely emptied of their contents. There was, however, a third abscess situated between stomach and diaphragm, which it would have been difficult to drain, and this gave rise to the patient's death. Of the other 2 patients, the one—a woman—had been cured with exception of a superficial wound; the other, a young man aged 18

years, "appeared to be on the road to recovery!" As regards the technique of operation, the author is opposed to antiseptic irrigation, and prefers dry sponging of the intestines. He has abstained from searching for or resecting the appendix, so as not to prolong the operation and increase the already marked debility of his patients. If it had been possible, however, to bring the appendix readily into view, he would have considered its removal an advantage to the patients. In cases of sacculated abscess the necessity of incision is generally acknowledged, and this should be done as early as possible, on account of the danger of rupture, and also to prevent the development of pyæmia, which the author observed in a case treated by non-operative measures.

Fraenkel⁸⁴ opposes the view that there is at this stage always pus-formation, and frequently the tumors felt in this region are due to the matting together of the gut, in which sometimes the omentum is involved. By an unusual length of the process the abscess may empty into the bladder or behind the right kidney, or may even be mistaken for an abscess of the liver. On account of the difficulties of a correct diagnosis it is not advisable to call in surgical aid until the presence of pus is very certain; and until this has been proved the intestines should be held quiet by the use of opium, and a general antiphlogistic plan of treatment adopted.

In a discussion on the advisability of resorting to operative measures in perityphlitis, as advocated by Sonnenburg, Ewald^{4 15}_{No. 16, July} stated that he could not recognize the indications given. One ought not to seize on and explore every perityphlitic abscess, more particularly when the proof of its existence is doubtful and only a mere suspicion. Bearing in mind the large percentage of spontaneous recoveries,—going as high as 90 per cent.,—there should not be undertaken, without the most pressing grounds, an operation which may have, under various circumstances, most unfortunate results. When general peritonitis sets in as a complication, surgical treatment is necessary. Further, late abscesses in patients suffering from perityphlitis may be opened when all chance of absorption has passed. It is also indicated in cases ushered in by alarming symptoms, which show themselves by intermittent or remittent fever, rigors, with small, weak, and frequent pulse, which may exist side by side with a strong beat, and other symptoms of collapse. With regard to the diagnosis of perityphlitis, we are

not so certain as to be able to say: Here is perityphlitis, and an abscess exists situated deeply which ought to be incised. It is difficult to understand that an abscess should develop above, after incision in the abdominal wall, as Sonnenburg described. They develop rather in a way impossible to determine beforehand. Moreover, cases occur running the course of perforative perityphlitis, but where the suppuration is very slight, diffuse, or limited to a small collection of pus; or a paratyphlitic inflammation develops in the retroperitoneal tissue and death ensues not through the suppuration, but by paralysis of the gut and the obstruction and intoxication induced thereby. These cases run a severe and alarming course, and the best treatment is removal of the intestinal contents in every possible way, especially by washing out the stomach. In many cases where there is blocking up of contents the stomach is already filled with faeces, although faecal vomiting is not present; and if one waits until the graver symptoms of ileus occur, it is usually too late to do anything. If the stomach is washed out soon after the onset of faecal stoppage, the faecal masses removed, and this done two or three times daily, the intestines may be relieved, and the decomposition of their contents and absorption of toxic substances prevented. Ewald has repeatedly observed good effects from this treatment.

E. Sonnenburg ^{338, 36}_{No. 19, July} discriminates between circumscribed suppuration and diffuse sero-fibrinous exudations in these cases, and only advocates operative treatment in the former group, in which he would interfere by operation, whether threatening symptoms exist or not. In cases where the pus-cavity is deep-seated or obscure Sonnenburg recommends operation in two stages. On the second or third day of illness he incises freely down to the peritoneum, at the part where tenderness and resistance most distinctly lead one to suspect the presence of the pus; then, after an interval, varying in his cases from one day to five, he explores with a hollow needle, and daily repeats the manoeuvre till the abscess-cavity is found. He believes that the primary incision not only enables one more readily to determine where the pus lies, but also in a measure brings about "pointing" from diminution of the pressure of the wall at the part. The punctures, so far from doing injury, provoke, he thinks, adhesions which will shut off the peritoneal cavity. Sonnenburg advises against removal of the appendix

vermiformis if at all adherent, though regarding the step as theoretically the correct treatment.

J. Vollert ⁸⁰_{Aug. 18, 20;} ¹¹²_{Nov.} gives the results in 65 cases of perityphlitis occurring in Nothnagel's clinic during seven and three-quarter years. Fifty-five were male, 10 female. One case was between 8 and 9 years of age, 26 cases were between 11 and 20 years, 19 between 21 and 31 years, 6 between 31 and 40 years, 7 between 41 and 50, and 4 from 51 to 60 years. Thirty-four cases were cured, 25 improved, 2 uncured, 3 died, and 1 was transferred to Billroth's clinic. As regards the treatment, in the commencement it is antiphlogistic: leeches (up to ten) are first applied, and then ice or Leiter's coil. When cold does not agree, then warmth in the form of a mush poultice is applied. Later the parts are painted with iodoform collodion, to which equal parts of the tincture of iodine and tincture of nut-galls have been added. To hasten absorption, *sapo viridis* is rubbed in. The diet is to be attended to and compound tincture of cinchona given; also, opium,—not in all cases, but, still, tolerably often. As the affection subsides, if the bowels do not move spontaneously, enemata may be given, or compound licorice-powder or Carlsbad salts. For chronic cases with persistent exudate, warm, moist applications with massage are advised. Purgatives should also be employed. While antipyretics were not commonly employed, still, in 1 case with diffuse peritonitis, pyæmia, accompanied by chills, etc., quinia, salicylate of sodium, and antipyrin were used. This case was finally cured at the end of five months. Of the 3 fatal cases, 2 died from perforation of the appendix and 1 from carcinoma of the cæcum. Arguing from these cases, operation is to be advised when pus is demonstrated to be present. In the first few days of a recent perityphlitis operation is not advisable, as there are many cases with acute symptoms, high fever, severe pain, and considerable swelling, which, under medical treatment, will subside, if not on the second day, at least in a few days. In recent cases it is well to wait awhile to see whether an operation cannot be dispensed with. When, however, an easily diagnosed exudate persists and there is fever accompanying the suppuration, then an operation may be done. In recent cases it may also be resorted to, if a definite abscess is present. On the other hand, large perityphlitic deposits of pus have been seen to be absorbed. After the onset of general peritonitis

the progress is unfavorable, whether operation is done or not. If the processus vermiformis is perforated it is best to resect it, unless, on account of adhesions to the cæcum, mesentery, or neighboring intestines, its removal is rendered difficult or impossible. The protecting adhesions must be allowed to remain. Operation certainly cures more quickly than internal medication, and obviates recurrences.

W. W. Keen, of Philadelphia, ¹⁷⁰_{Dec.} reported a case which he wishes to place on record as a lesson in diagnosis and a warning in treatment: "When first called to see it, the history, the collapse, the rigidity of the right side of the belly, and the flexure of the right leg, all betokened an appendicitis. And yet the right iliac fossa was free from tenderness, free from tumor, free from œdema, free from pain. There was a slight pain and tenderness all over the right half of the belly, but the most painful spot was far away from McBurney's point, and was just under the border of the liver and about an inch inside the line of the anterior superior spine. The abdomen at this point, over an area of 2.5 to 3 inches, was so exquisitely tender that no satisfactory examination could be made. Although appendicitis was in my mind as a first thought, the position of the tenderness suggested probable rupture of the gall-bladder from gall-stones, or a renal calculus, as the probable cause. When the abdomen was opened the localized path of peritonitis was external to the attachments of the mesocolon, and showed no indication of any trouble back of the colon as its possible cause. In spite of this, however, I examined three several times, with the most minute care, the entire region of the colon, from the cæcum to the hepatic flexure; first on its outer side, then on its inner side, and then by bimanual examination from side to side, and by palpation from before backward, but could detect no hardness or other evidence of any abscess. That no larger an amount of pus (less than 2 drachms, or 8 grammes) should have formed after an illness lasting eight days is very unusual, and, while I deeply regret not having discovered the abscess (at the tip of the appendix), I cannot but console myself with the thought that it was not for the want of a careful and thorough search, but by reason of the unusual conditions and the small size of the abscess. Whether in the absence of all physical signs of such an abscess it would have been my

duty to dissect up the colon in order to examine the recto-colic tissues and appendix, or to have torn through the outer layer of the mesocolon, is a question I have much debated. Viewing now the facts, I greatly regret not having done so, and I report the case especially as a guide and warning to other surgeons who may meet with similar cases."

Joseph Price¹⁷⁰ suggests the following rules in deciding operative or non-operative character of the case: 1. Do not operate on the first day,—usually,—because the number of mild cases is undoubtedly large. One operator (McBurney) saw 13 cases in one year too mild for operation. 2. If nausea disappears in twelve hours; if tenderness on pressure not increased in twelve hours; if temperature normal, or not above 100° F. (37.8° C.) in the mouth; if pulse normal or but little accelerated; if patient moves in bed with ease: recovery without operation probable.

As to sites for incision, there is a choice for free incisions as follows: (1) median line below umbilicus (Gerster); (2) outer margin of right rectus muscle below level of umbilicus (Sands).

There are several places at which the "limited incision" (done in the later stage of the affection for simple evacuation) may be made; they are: (1) parallel to Poupart's ligament, about one inch above it, to above and beyond anterior spine of the ilium (Willard Parker's oblique incision); (2) through floor of iliac fossa; (3) through rectum. The median line is chosen as a site for the incision in cases of doubtful diagnosis for special indications. The lateral incision is generally chosen for early operations. The oblique incision is made for well-developed abscesses mainly adherent to the anterior abdominal wall (Reclus). The lateral incision is preferred, because (1) it lies directly over the route of the appendix; (2) it exposes the field of operation more favorably than the median; (3) it creates a shorter, a less exposed, line of drainage. The advantages of the median incision are: (1) greater probability of not encountering adhesions between the anterior wall and the intestines in the line of incision; (2) easier access to all parts of the peritoneal cavity for washing and for drainage. Adhesions are to be freed with the finger.

As to washing, it has been asserted that hot water is (1) not stimulating; (2) not cleansing in irrigation; (3) its use soon followed

by depression—marked ; (4) its contact with the peritoneum injurious ; (5) that sponging is more quickly done than irrigation ; that, it being impossible to cleanse hands with soap, water, brush, “ rinsing (irrigation) is ridiculous.” The above statements are false. If pus is found in open pockets, wash out abscess-cavities, seek appendix, tie, cut off, invert, cover with or by Lembert’s sutures through the outer layer of the cæcum, pack space between incision and abscess with gauze and iodoform, drain by rubber tube or rubber and glass, partly close wound, withdraw packing from between intestines on first and second day, and withdraw tube and remainder of packing when circumstances indicate.

Make a counter-opening for drainage in the flank, above crest of ilium, or through rectum, or where there is a sinus. If little trouble is found, the removal of a but slightly diseased appendix cuts off the possibility of a recurrence, and is an advisable procedure. Where nothing is found when an exploratory operation is made “ exploratory operations will result in fewer deaths by far than the expectant delay which has heretofore been the general rule.” Exploratory operation “ carries with it less danger than the disease” ; it has but few risks.

Searing the mucosa of the stump with pure carbolic acid or Paquelin’s cautery is simply lowering the vitality of an already devitalized part. To ligate appendix, it is recommended to invaginate the stump and suture after Lembert.

R. F. Weir, of New York,⁹⁶ alluding to cases of relapsing appendicitis, concludes : 1. That the final outcome of the review of these cases has been that the large majority of recurrent attacks are due to catarrhal appendicitis, which, though to an unknown degree capable of producing explosive and serious peritoneal inflammation, yet generally, from the lumen of the tube being previously shut off from the cæcum, limit correspondingly the chances of fæcal or severe infection of the peritoneum. 2. That the simple catarrhal appendicitis can be suspected when the recurrences are frequent,—that is to say, more than four or five times, as in the acute processes this is seldom exceeded, and when such attacks are not of a severe type nor of a greater duration than a week, and particularly so if there be no appearance of a distinct tumor. 3. In such cases delay in operating may be encouraged to a reasonable extent ; at least, until it is indubitably proven that the invalidism is

a confirmed one. Out of 5 cases seen by him in the last year for recurrent attacks of appendicitis, in 3 of the above-described simple form it was advised to wait till the next acute attack presented itself as a further justification of surgical interference, but this did not occur in any of these. In the 2 others, from the persistent invalidism, or the severity of some of the attacks, an operation was advised. 4. Where a tumor is present in the quiescent stage, or has been decidedly felt after the acuteness of the attack has passed off, more urgency is present, as it indicates, it is believed, either an accumulation of noxious contents, or of ulceration within the appendix, or an already present small perforation. It is in such cases that Mackenzie says that we can expect, if an acute process is subsequently set up, that it will be of the circumscribed rather than a general suppurative peritonitis. The frequent conjunction, in the collected cases, of adhesions with the severer forms of the catarrhal appendicitis, with retained secretions, or with minute perforations seems to corroborate this view. 5. That as the diagnosis of the separate condition of simple catarrhal appendicitis and its complications of distension from retained fluids and of ulceration are not to be at present differentially diagnosticated, and as it has been shown that each can give rise to dangerous conditions, recurrences of severity and frequency should hereafter mean that an exploratory laparotomy should be resorted to, on the general principle of this being of less risk than the disease itself.

C. B. Porter, of Boston,⁹⁹_{Apr. 2} advocates excision of the appendix during a remission in recurring appendicitis, and enumerates 15 cases which he has been able to trace, including 2 of his own, all of which made excellent recoveries.

The following articles, though containing nothing particularly new, are, nevertheless, valuable additions to the literature of the subject, and will prove of assistance in the preparation of papers on appendicitis:—

Krecke, of Erlangen,³⁰¹_{B. 30, H. 4, 5; Jan.}⁹⁶ on the surgical treatment of circumscribed and general peritonitis, starting from the vermiform appendix; A. Jackson, of Sheffield,²²_{Feb. 11} and Thos. S. K. Morton, of Philadelphia,¹⁹_{Nov. 21} outlines of the surgery of this organ; Thos. G. Morton, of Philadelphia,⁶¹_{July 25} several cases of appendicitis and pericæcal inflammation illustrating unusual difficulties in diagnosis; an interesting discussion before the Medical Society of Victoria,²⁸⁵_{June}

following the reading of a paper on typhlitis, by G. A. Syme, of Melbourne.²⁸⁵ A. Polis, of Liège,²⁹³ and H. Reineking, Sheboygan, Wis.,¹⁹ reports of cases of perforative appendicitis; Figueira, of Brooklyn¹⁵⁷; E. P. Hurd, Newburyport, Mass.²⁰²; F. Lange, New York¹⁵⁰; and Renvers, Berlin,⁶⁹ general papers on perityphlitis; R. Harvey Reed, Mansfield, O.,⁵⁸ on the surgical treatment of chronic catarrhal appendicitis; also discussed by George W. Gay, Boston⁹⁹; W. W. Ransom, Birmingham, Ala.⁶⁴⁷; W. C. Galloway, Winston, N. C.⁴³; Routier, Paris³; Axel Iversen, Copenhagen⁶⁹; A. C. Lamothe-Ramsay, St. Cloud, Minn.²²¹; and Piéchaud, Bordeaux.¹⁸⁸

Henry O. Marcy, Boston,⁹⁹ reports a successful operation for recurrent appendicitis with adhesive bands about the head of the colon. The propriety of and the indications for the resection of the appendix vermiformis during the quiescent stage of chronic relapsing appendicitis is discussed by Joseph Price, of Philadelphia.⁹⁶ Cases are reported by H. T. Machell, Toronto⁸⁹; W. M. Polk, New York²⁷; Weiss, Nancy¹⁸⁴; F. W. Epley, New Richmond, Wis.¹⁰⁵; B. Farquhar Curtis, New York¹; T. H. Manley, New York²³; H. W. Allingham, London²; Andrew Clark²; L. A. Stimson, New York¹; B. F. Kingsley, San Antonio, Tex.¹⁵⁷; C. Koch, Nürnberg³⁴; H. Walker, Toronto⁸⁹; J. B. Weydner, Neckar-Steinach³⁴; Henry McElderry, West Point, N. Y.¹; J. W. Elliot, Boston⁹⁹; von Mandach, Jr., Schaffhausen²¹⁴; Lunn, London⁶; Léon Beco, Liège²⁹³; Flintermann, Detroit¹⁸⁵; MacDonnell and Armstrong, Montreal²⁸²; Davis⁶⁴⁷; T. K. Holmes, Chatham, Can.⁸⁹; W. L. Conklin, Rochester, N. Y.¹⁹; W. W. Keen, Philadelphia⁷⁶⁰; C. L. Cotton, Cowansville, Quebec²⁸²; G. Wackerhagen, Brooklyn¹⁵⁷; Ashhurst, Philadelphia¹¹²; Morton, Philadelphia⁹; Joseph Price, Philadelphia⁶⁵; Huntington, Sacramento¹⁴⁷; C. S. Briggs, Nashville¹²⁰; and Chas Phelps, of New York.⁸⁹

The following authors report cases of recurrent appendicitis where removal of the appendix was followed by good recovery: C. B. Porter, Boston⁹⁹; A. T. Cabot, Boston⁹⁹; H. W. Rand, Brooklyn¹⁵⁷; Napier and Maylard, Glasgow²¹³; G. H. Hume, Newcastle-on-Tyne²; T. Pridgin Teale, Leeds²; and J. E. Summers, Omaha,⁹ the latter in a child 22 months old, for suppurative appendicitis.

INTESTINAL PERFORATION IN TYPHOID FEVER.

Van Hook, ⁹_{V. 40, No. 21, Jan., '78}, ⁸⁰ after a careful consideration of the question of operation in cases of intestinal perforation occurring in the course of typhoid fever, records 3 cases in which such an operation was performed.

The first case had a light attack of fever lasting about three weeks. During convalescence a relapse occurred. On the seventh day of the supposed relapse an enema of warm water was given for the purpose of making the bowels move. This was followed by several passages and by violent pain in the ileo-cæcal region, accompanied by profuse diaphoresis, coldness of the extremities, and an excessively pinched and anxious expression of the countenance. Temperature, 105° F. (40.6° C.); pulse, 126. The pain ceased in a short time. In a few hours temperature ran up to 106° F. (41.1° C.), the pulse to 132, and the patient suffered from tympanites and tenderness on pressure over the ileo-cæcal region. The abdomen was opened as soon as possible, and more than a pint of fluid fæces and exudate mixed with flocculent lymph was removed. On exposing the small intestine numerous ulcers were seen; all the coils of the intestine were ingested and dull-looking, and the fæcal matter was freely circulating in the peritoneal sac. A perfectly circular, minute opening was found. This was closed by means of the Lembert suture, three rows being applied on account of the brittle condition of the gut-wall. The peritoneal cavity was thoroughly cleansed out with hot sterilized water. The omentum was drawn over the injured coil of intestine and sutured to the mesentery, Douglas's *cul-de-sac* was drained, and the remainder of the abdominal wound was closed. Great distension followed this operation. This yielded to enemata of sulphate of magnesium with glycerin and water. The patient recovered.

The second case developed symptoms of perforation and sinking upon getting out of bed during what was apparently the third or fourth week of typhoid fever. She was collapsed, and there was also liver dullness. The abdomen was opened seven hours after perforation occurred. The peritoneal sac was filled with thin, liquid, flocculent matter. On account of the patient's condition the operation could not be completed, the patient perishing a few minutes after she was taken from the table. The autopsy showed an oval perforation of the ileum eighteen inches above the head of the colon.

The third case exhibited, on section, a perforating ulcer twelve inches above the ileo-cæcal valve. The opening was closed by a double row of Lembert sutures. The patient lived seventeen hours. The autopsy showed general peritonitis.

Of the 19 recorded cases of laparotomy for perforation by typhoid ulcers there were 4 recoveries. In some of the cases of recovery the diagnosis was doubtful. In the great majority of cases the perforations were within two or three feet of the cæcum, usually in the ileum; rarely in the colon. Hence this part of the bowel only should be searched. The perforation, when found, should be closed by a line of sutures placed parallel to the long axis of the bowel. These sutures should be interrupted. The abdominal cavity should be thoroughly washed out by means of a thick stream of sterilized salt solution at a temperature of 105° to 112° F. (40.6° to 44.4° C.).

In these cases the anæsthetic should be chloroform. The author draws, from his study of the subject, the following conclusions: (1) There is no rational treatment for perforation in the course of typhoid fever except laparotomy; (2) when perforation occurs in typhoid fever the indication for laparotomy is imperative; (3) the only contra-indication is a moribund condition of the patient; (4) collapse is often, at least temporarily, relievable by hot peritoneal flushing; (5) the stage of the fever is not to be considered as an indication or as a contra-indication for laparotomy; (6) the severity of the typhoid fever is alone not a contra-indication; (7) early laparotomy offers the most hope; (8) the symptoms of peritonitis should not be awaited before operating; (9) the published statistics of laparotomy for this condition are strongly in favor of operation; (10) the technique, though not complicated, demands much thoughtfulness, acquired dexterity, great rapidity, and thoroughness.

C. Louis, of Paris, ⁷⁸_{Dec. 27, 90} publishes a review of the subject, in which, of the 11 laparotomies reported, 2 only—those of Mikulicz and Escher—were saved. He, nevertheless, concludes that in no case could the operation be said to have increased the danger for the patient. The operation, to succeed, must be done as early in the case as possible, and with vigorous antisepsis. It must be performed as rapidly as possible, thus placing the operation within the scope of experienced hands only, to give the patient the best

chances of life. A median laparotomy being performed, the ending of the ileum in the iliac fossa is to be sought after. The perforation being closed (or, to go faster, an artificial anus being created), the peritoneal cavity is quickly, though carefully, washed and a drain established. In the female a drain can be passed through the vagina (Lücke) and another through the abdominal cavity, thus permitting boiled-water irrigations through the tubes (Bontecou).

HERNIA.

Habs, of Magdeburg, ³⁰¹_{B.M.H. 2, 4; Nov.} ³⁶ has collected and tabulated 200 herniotomies performed in Hagedorn's clinic between 1883 and 1890. Thirteen operations were done in cases of reducible hernia, 17 in irreducible, with good results in all; 170 were done in strangulated hernia, with 29 deaths (17 per cent., or 14.5 per cent. of the whole number of cases). In only 7 instances did death immediately follow the operation. Of 16 primary enterectomies, 9 proved fatal, or 56.3 per cent.; only 2, however, as the result of operation,—1 of bleeding, the other of peritonitis due to stitches. Enterectomies were not found to require longer hospital treatment than the other cases. In strangulated herniæ the mortality rose (1) with the age of the patient (5.6 per cent. at 20 to 30 years, 17.8 per cent. at 50 to 60, 57.1 at 70 to 80) and (2) with the duration of the strangulation: after one day, 10 per cent. died; two days, 5 per cent.; three days, 10 per cent.; four days, 31 per cent.; seven days, 50 per cent.; eight days, 62 per cent.

Haidenthaler ³³⁶_{No. 80, 70} publishes statistics of the results of operations for the radical cure of hernia in Billroth's clinic. They comprise 136 cases of inguinal, femoral, and umbilical rupture in both sexes. In 93 cases an operation had been performed, whilst in 5 instances the patients were treated by injecting alcohol into the sac. The operation employed was Czerny's, and consisted in ligaturing and removing the neck of the sac, and uniting the deep and superficial parts of the wound with silk sutures. The mortality in the non-strangulated cases was between 6 and 7 per cent., and the causes of death when it occurred were entirely of septic origin. As to the final results, they were mostly true cases of radical cure, though occasionally the hernia returned,—in 1 instance six years after the first operation, and in 3 cases after a lapse of five years. The cases of alcoholic injection of the sac seemed at first to yield

excellent results, but they were not permanent. The surgeons owed a great deal of the success of their operations to the thickness of the silk ligatures. The stouter ones seemed to hold the edges of the wound longer in apposition, hence the success which it seems to yield.

Helferich ²²⁸_{R. 41, R. 2}, ²¹³_{June} says that, despite the brilliant results obtained in recent times, and more especially by Czerny and Kocher, primary resection of gangrenous bowel is still an operation of considerable risk. Where the gangrene is only threatened,—that is, where the condition of the bowel would commonly be described as doubtful,—an operator will naturally shrink from such a severe procedure. Hitherto the alternative usually adopted in such cases has been to leave the loop lying in or projecting from the wound after relief of the constriction. But this has the drawback that in most cases it makes no provision for the circulation of the intestinal contents. Strangulation is relieved, but not obstruction,—unless, indeed, very free division of the hernial orifice be practiced, which, for obvious reasons, is undesirable. Helferich recommends the formation of an entero-anastomosis between the afferent and efferent portions of intestine. A considerable length of bowel on the efferent side may have to be pulled down in order to get the part which has suffered by extreme distension (above the constriction). This will vary according to the duration of the strangulation, but a certain amount of circulatory disturbance is no contra-indication, and a hand's breadth above the point of constriction will in most cases suffice. Contents of the coils are to be pressed back and the coils compressed with loops of India-rubber tubing passed through the mesentery, careful packing of the wound to prevent contamination by fæces, incisions longitudinally opposite mesenteric attachment about four centimetres long, washing out of the included portion of bowel, and careful stitching. As to the use of Senn's bony or other rings, Helferich has so far not ventured to use them, being restrained by fear of their pressure acting injuriously on a bowel whose vitality is already impaired.

Helferich records 2 cases: in the successful one gangrene of the suspected loop occurred, and the portion was resected. This is to be done some little way from the hernial orifice,—say, one to two fingers' breadth. When union is complete, and this may require a further stitch or two, reduction may be attended to. This tends

to occur spontaneously, and the careful use of compresses may suffice to make it complete. The other case recorded, a woman of 76, died on the day of the operation, she having already been very much reduced (three days' strangulation). It is of interest that great congestion of the lungs was found, with fat embolism; this was attributed to the attempts at taxis preceding operation acting on a mass of omentum which accompanied the bowel.

From an article by J. Lesshaft,²⁰_{R. 120, H. 2, Aug.}⁴⁰ it would appear that the frequency with which pneumonia follows upon the reduction of strangulated hernia—operated on by taxis or by herniotomy—and the relation which such lung trouble bears to the intestinal lesion have both been variously estimated. Lesshaft is mainly concerned in correcting the impression conveyed by von Pietrzkowski, who has recently maintained that pneumonia (as judged by clinical signs) is comparatively frequent in these cases, and who further supports the views held by Gussenbauer as to its causation. These views refer the pulmonary condition to embolism following upon thrombosis in the veins and capillaries of the walls of the strangulated bowel, in those cases at least in which no other explanation—*e.g.*, by direct extension from peritonitis or pyæmia—can be afforded. Lesshaft, on the contrary, after an analysis of all the fatal cases of hernia examined at the Berlin Pathological Institute during thirty years, thinks the hypothesis of embolism is not justified on pathological grounds. He shows that the circumstances under which pneumonia occurs as a sequel to strangulated hernia, and the character of the pulmonary lesions, are such as may well be explained by the entrance into the air-passages of vomited matters. The condition, therefore, is one of *Aspirations-pneumonie*, or *Schluck-pneumonie*; and that it should be more liable to occur in cases of severe strangulation, or those in which gangrene of the gut takes place, is not surprising, since these are just the cases in which vomiting is most likely to be severe. Pietrzkowski has adduced experimental proofs in support of his thesis, which, however, are not substantiated by Lesshaft, who found that in the rabbit pneumonia never followed artificial strangulation of the intestine; and in the dog it only occurred when it was possible for the aspiration of vomited matter to take place. Indeed, Lesshaft is convinced that pulmonary infarctions do not occur in connection with the intestinal changes.

L. Bazet, of San Francisco,¹⁴⁷ read a paper before the California State Medical Society upon radical cure of hernia, reporting 15 operations. For the purpose of comparison, he had operated by three different methods, viz., those of Bassini (4 times), McBurney (4 times), and Championnière (7 times). The average time of operation was one hour and thirty-one minutes and the average time for cure twenty-four days. One case died of septic peritonitis and 1 from collapse; 1 case recurred. The operations of Macewen and of Ball were not employed, as he believed that a radical cure could not be effected without excision of the sac. Championnière's operation is applicable to hernia in general; that of Bassini and McBurney to inguinal hernia especially. The speaker then gave the steps of the different operations, and described certain modifications of each. In operations for radical cure the principal point is to reach the sac, for the purpose of resection and to approach as near as possible the ideal; the neck of the sac must be excised above the internal ring. In these operations Bassini and Championnière suture and drain; McBurney treats the open wound by packing with gauze. The former seeks to effect union by first intention; the latter, secondary union by granulation, believing that this avoids the danger of infection and produces a stronger cicatrix. The speaker had encountered serious difficulties in closing the wound without drainage. Suppuration followed in 3 cases, of which 1 died. After mentioning various possible sources of infection, he concluded that want of drainage was the most important factor, and that antisepsis could not alone be relied upon. In operating for radical cure he had declined those cases in which, according to Trélat, the hernia could be completely, easily, and permanently reduced by means of a truss. Regarding the choice of methods, he chose, with Verneuil, that which, with an equal degree of efficacy, presents the most benignity and the greatest facility of execution.

Umbilical and Abdominal Hernia. — Von Bergmann^{84 101}
No. 5; Apr. states that, in young persons suffering from gastric disorders, a careful examination sometimes reveals the presence of small tumors, no larger than a hazel-nut, in the linea alba, between the ensiform appendix and umbilicus, at the site of an *inscriptio tendinæ* in the rectus. These hernial protrusions usually contain only omentum, and, as the sac cannot readily be felt, the tumors

may be mistaken for lipomata of the abdominal walls. They give rise to severe pains and vomiting, and these symptoms are probably due to traction of the tumors on the stomach. The radical operation for hernia causes a complete disappearance of the disturbances. König states that he has operated on 20 cases of this kind, and has found it especially difficult to make a diagnosis where there was a thick layer of fat. The characteristic symptom is the neuralgic pain which radiates around the abdomen.

O. Witzel ⁴⁰⁴_{No. 10}, ²⁵_{Apr.} holds that abdominal hernia is not of unfrequent occurrence, and, as was pointed out by Richter, is often the cause of obscure and troublesome gastric disturbance. This variety of hernia usually protrudes through one of the gaps formed in the linea alba by the interlacing of the aponeurosis of the oblique muscles on opposite sides of the abdominal wall. These gaps in the normal condition are very narrow, and the longest diameter of each is in the transverse direction. The commissure of connective tissue between the recti muscles, which forms the linea alba, increases in width as it ascends to the ensiform appendix, and, in cases of emaciation from exhausting disease, becomes much wider.

The statements of the early writers on abdominal hernia that this lesion is met with more frequently in women than in men have not been confirmed by more recent observers. In 10 cases collected by Malgaigne the two sexes were equally represented, and in 12 instances observed by Witzel the hernia occurred 7 times in males and 5 times in females.

Edebohls, of New York, ²⁷_{May}, ³⁶_{Aug.} records a case in which the cure of ventral hernia occurring as a sequel of laparotomy was achieved by dissecting the cutaneous from the peritoneal layer of the hernial sac practically without opening the peritoneum, inverting the peritoneal pouch, and bringing together over it the separated margins of the recti muscles, fascia, and skin. The author sees possible contra-indications in the presence of ulcerations, excessive size, or extreme thinness of the hernial sac. He claims three advantages for the operation: (1) that it takes it out of the category of laparotomies; (2) the strengthening of the new cicatrix by the inverted peritoneum; and (3) the possibility of a hernia, the contents of which are matted together, being returned *en masse* into the abdomen.

The majority of English text-books advise that, in case of

strangulated hernia reduced *en masse*, the seat of the hernia should be explored, the sac drawn down, and the stricture divided, as in the ordinary operation of herniotomy. In an elaborate paper by Birkett,²¹⁶³_{v.42} 37 cases are collected, of which 8 died without intervention, and 29 were operated upon, all locally; of these 29, 16 were fatal and 13 recovered. In 2 cases coming under his observation, William Thorburn, of the Manchester Royal Infirmary,⁹⁰_{Sept.} has substituted laparotomy for local herniotomy with satisfactory results. After emptying the bladder, he makes an incision in the linea alba, about 2½ or 3 inches (6.25 to 7.50 centimetres) in length, extending downward from the umbilicus. If the recti be much developed, and proper exploration impossible through this incision, a second horizontal cut is carried outward through the rectus on the affected side. The finger is then introduced and the gut drawn into the abdomen, if possible; if not, the neck of the sac is slightly notched and the gut withdrawn. The ring may then be sutured with catgut through its different diameters, so that when the sutures are tied they completely close the opening. The strangulated gut is then washed and replaced, the peritoneal cavity being sponged out, and the abdomen closed by three series of sutures, viz., continuous catgut for the peritoneum and muscles respectively, and interrupted silk for the skin. The wound is supported, after healing, with strapping and a bandage; an abdominal belt is worn later. In both cases the scar was firm, and the patients carry on their work as laboring men without support. In cases, however, where it is suspected that the gut is gangrenous or perforated, the author thinks the old local operation will probably be the safer one.

Vulp⁷⁶¹_{Bl.7},¹⁵⁷_{Aug.} divides the cases of umbilical hernia studied into the strangulated and non-strangulated variety. Sixty cases of the former are collected from the literature upon the subject, among which are 2 from the Heidelberg clinic, as well as 8 cases of strangulated ventral hernia not to be classed as umbilical. The high mortality (18.3 per cent.) of the operation in these strangulated cases is not to be attributed to the operation itself; non-strangulated cases furnish invaluable statistics in the study of the subject of operative interference. Seventy-two cases of the non-strangulated class are collected, operated upon in the antiseptic period, and it is noteworthy that among these no fatal cases have

occurred. This extraordinary result shows, according to Vulpinus, how groundless is the fear, usually entertained by surgeons, of attacking this class of cases. The following conclusions regarding the radical operation in these cases are arrived at: (1) the operation is indicated as an addendum to an early herniotomy of a strangulated hernia; (2) in cases in which, whether the hernial mass be reducible or irreducible, decided disturbances to the patient's comfort occur. The operation itself consists of a ligature and excision of the sac and suture of the ring. A supporting bandage or truss-pad is to be subsequently worn.

F. Wolf ⁸⁴⁴_{Nov.}, ²⁵_{Feb.} draws attention to Schede's report of 165 operations of abdominal hernia. Of these, 61 were incarcerated inguinal hernia and 64 incarcerated femoral hernia. In only 41 per cent. was there no reaction in the wound after radical operation of incarcerated hernia and in 35 per cent. of the not incarcerated cases. Wolf pleads strongly for omitting drainage, if at all possible. The average period of healing is twenty days in incarcerated hernia and in others twenty-one days. Two per cent. of the patients died after radical operation. Two patients died from complications not connected with the operations. Wolf comes to the conclusion, from observations of his own and others, that a radical operation may be pronounced successful if no relapse occurs within a year. According to this standard, 25.9 per cent. of the above-mentioned patients were not radically healed; but even they were satisfied with the results of the operations, because their condition was materially improved and they were able to go to work. The chief conditions of success of the radical operation are: ligation of the neck of the hernial sac as high up as possible, extirpation of the sac, suture of the porta, and, when necessary, division of the inguinal canal. Silver wire is the best for suture, as it causes no reaction and supports the cicatrization tissue. Extirpation of the hernial sac influences the result only in so far as it renders the course of the wound shorter and simpler. The bed of the hernia is united by several deep stitches of catgut (No. 1), in such a way that the surfaces of the wound meet everywhere. Then follows a superficial, continuous suture of catgut. Schede warns against washing out the wound with the irrigator, as even a gentle force of the spray causes an œdema of the loose cellular tissue of the scrotum. While Wolf does not consider

that the wearing of a truss hinders the healing of the hernial porta, Schede asserts that sometimes the pressure of the pelote induces atrophy of the cicatrix, and thus favors a relapse. Prognosis of radical healing is more favorable in the case of femoral than in that of inguinal hernia,—more favorable, too, when the hernia is small, and when the hernial porta represents a slanting canal. Of particularly great importance for final healing is the width of the porta; the wider the latter is, the less favorable are the prospects, and in just such cases sutures of silver wire are recommended. The age most favorable for healing are the years up to 20. Hard bodily work does not seem to cause a relapse, while cachectic conditions, with lax muscles and emaciation, are dangerous. Violent coughing after the operation, indeed, endangers the same; yet in 1 case, although there occurred spasmodic coughing, the results in nine days were good, and ten years afterward the healing was still found to be perfect. Then Wolf goes on to determine the indications for the radical operation of free hernia. In the early years of life a conservative treatment is to be recommended, as spontaneous healing is then the rule, and the fouling of the bandages would endanger the course of the wound. From the seventh year a radical operation is preferable, since spontaneous healing can no longer be reckoned on, and the conditions are most favorable for a good result. Yet up to the twentieth year smaller ruptures that give little trouble may be treated conservatively. Beyond the latter age a radical operation should be always recommended, for after the complete development of the body the likelihood of spontaneous healing may be excluded. In irreducible hernia, and such as cannot be kept back by a truss, the radical operation should be strongly recommended to the patient. Contra-indications are cachectic conditions, especially in old people with large ruptures.

Inguinal Hernia.—At the Congress of German Surgeons Escher, of Trieste, ⁶⁹_{Apr. 22}; ¹⁰¹_{Sept.} reported his results from Bassini's radical cure of hernia. It consists in laying open the inguinal canal over its entire extent and somewhat beyond; the spermatic cord and hernial sac is then lifted up, and the latter incised up to its neck, and then ligated, excised, and the remaining portion replaced. The layers of the internal oblique and transversalis muscles are then carefully isolated, as well as the internal portion of Poupart's ligament, and the edges of these structures are accu-

A. Köchler^{336 157}_{No. 7; June} suggests a new procedure to replace the purse-string suture heretofore employed, in which the hernial sac is employed as a "stopper" for the hernial opening. The sac is completely loosened from the spermatic cord, the peripheral end is removed, and the balance is slit into three or four strips. These are rolled up separately, with the surface which presented to the wound (the external surface of the sac) outward, and each roll is sutured, to prevent unrolling, by means of catgut; finally, all the rolls, together with the pillars, are sutured together, and the wound is closed by buried sutures. In subsequent cases the rolls were not stitched to the pillars, but were crowded into the abdominal cavity, and the latter sutured over the opening of the ring. The "stopper" should press against the internal ring, but not press into the inguinal canal. In 10 cases a good result was obtained; in 1 case, that of a laborer, a recurrence took place after a year. A subsequent operation in the latter led, apparently, to a good result.

J. Lucas-Championnière, of Paris,^{3 22}_{June 3; June 10} presented some observations before the Société de Chirurgie on the radical cure of inguinal hernia in woman. He said that this form of hernia is not at all infrequent in the opposite sex, and when the woman is young she is very much inconvenienced by the bandage, and later on, when pregnancy takes place, the apparatus is out of necessity laid aside, and consequently the volume of the rupture is increased. Inguinal hernia, on the other hand, differed considerably in woman from what we are accustomed to meet with in man, and he would make a few remarks on the congenital form, which he found to be very frequent. The congenital variety is due to the persistent patency of the canal of Nuck. Out of a total of 231 radical cures which he practiced for non-strangulated hernia, 14 were on women, and of this number 10 were congenital. The anatomical condition of the hernial sac and its connections show clearly that the lesion is congenital; the serous lining of the sac is intimately confounded with the fibres of the cord; it is frequent to find complementary small cysts reaching to labium majorum. The volume of these hernia is not generally very considerable; he observed, however, 1 case where it descended nearly to the knee. The hernia is particularly painful and irreducible. For the operation he would advise the incision to be made from above downward, in order to isolate the sac and the fibrous cord. The round ligament forms

an integral part of the sac and impossible to isolate, contrary to that observed in man, where the spermatic cord can always be separated. The sac should be carefully dissected in the abdomen, and then cut across along with the round ligament. When the sac is opened it is frequent to find the ovary in the cavity or at its orifice, or it may be normal, sclerosed, or atrophied. Lucas-Championnière has frequently removed it. One of the happiest results of the operation is the cessation of pain.

F. Krumm, ^{336 147}_{No. 14, July} after putting the question whether primary resection of the bowel should be done in the gangrenous-bowel cases, concludes that statistics show better results from removal of the gangrenous portion and careful stitching than from the formation of an artificial anus. At the same time, he is of the opinion that this step can never completely replace the older operation. He draws his conclusions from the practice in the clinic of Czerny, of Heidelberg.

B. T. Shimwell, of Philadelphia, ⁹_{Mar. 14} advocates the open method of operating in strangulated inguinal herniæ. He cuts directly through all the tissues of the tumor, including the external ring and, if necessary, the abdominal wall,—converting a simple herniotomy into a hernio-laparotomy.

S. E. Milliken, of New York, ¹_{May 16} referred to the danger of producing excoriation, or at times severe sloughing, with the ordinary trusses of the shops. If this condition was brought about, it made the treatment of hernia in young and delicate children exceedingly tedious and occasionally impossible. The hank-truss, of which the speaker thought too little was known, was constructed from a loop of zephyr of the best quality, containing from twenty-five to thirty strands. It was made of sufficient length to encircle the pelvis between the anterior superior spinous process and the trochanter major, with enough left to make a perineal strap. On one end a double tape was attached, corresponding to the affected side, and passed through the loop coming from the opposite side. Considerable care should be given to the adjustment of the loop.

Perineal Hernia in Women.—Winckel ⁴⁸_{Aug. '90}; ²_{Jan. 10} read before the Berlin Congress a monograph on what he termed perineal vagino-labial hernia. A series of drawings of cases were exhibited, with statistics of their nature and treatment. In all cases the hernia issued from the pelvis, out of the perineum, and distended the

labium majus. Winckel distinguished three varieties, which may be combined in the same subject. In the "anterior" form the sac protrudes between the sphincter vaginae and the erector clitoridis. In the "median" form it bulges between the sphincter vaginae and the deep transversalis perinei. In the "posterior" form the hernia passes before the levator ani and the gluteus maximus. The sac in all these varieties presents special characters of a nature only to be understood by the study of a good scientific demonstration. The abdominal orifice of the sac lies in front of or behind the lateral true ligament of the bladder. According to Winckel, the best treatment for all forms of perineal hernia in women is a radical operation, which must be performed from the perineal aspect, the sac being exposed by an incision through the vulvar structures.

Ischiatic Hernia.—Wassilieff⁹¹_{Mar.},²_{May}, describes a case of ischiatic hernia,—a very rare form. The patient, a man aged 54, was seized with pain in the left buttock whilst straining during defecation. Symptoms of acute strangulation set in. After careful exploration ischiatic hernia was diagnosed. The rupture was very tender. Taxis was undertaken, after preparations for an operation, and the mass went back. Relief was almost immediate. In the night, after a free escape of flatus, the symptoms recurred during an attempt to defecate. Taxis again effected reduction, and a stout pad was fixed, by means of a bandage, over the region of the great sciatic notch. Wassilieff divides ischiatic hernia into a supra-pyramidalis variety, where the intestine escapes between the border of the great sciatic notch and the upper margin of the pyramidalis. This is the commonest form, and if an operation be attempted the stricture should be divided toward the notch. The subpyramidalis variety includes a form where the gut escapes between the lower border of the pyramidalis and the lesser sacro-sciatic ligament (supra-spinous), and a form where it passes out between the lesser and the greater ligament (subspinous); but it is doubtful whether subspinous ischiatic hernia has ever occurred. Diagnosis is always difficult. The seat of the tumor and the pain, which appears to be severe, owing to the hardness of surrounding structures, as well as the general symptoms of hernia, are the chief guides to diagnosis. The hernia may contain omentum, large intestine, small intestine, bladder, or ovary. In operation, the skin incision must be parallel to the line of ligature of the gluteal artery.

Mesenteric Hernia.—A. G. Barrs, of Leeds, ⁶_{Aug. 9} reports a case of this exceedingly rare form of rupture. The external appearance was not much unlike that presented by the abdomen in pregnancy at term, except for the median depression, and suggested at once the rapidity with which the change had been established. On opening the body in the ordinary way, one at once came upon what appeared to be a second sac of peritoneum, containing apparently the whole of the small intestine, which could be seen distinctly through its walls. This sac corresponded to and was clearly the cause of the unusual shape and distension of the abdomen. It was quite as large as an adult head, perfectly symmetrical, and extremely tense. It appeared to be free toward its upper left and lower limits, so that one's hand could be passed around it in these directions, but attached in all its parts to the right. It could be easily displaced or turned over to the right side, when a large aperture leading to its interior was at once exposed. The anatomical features of the case are shown in the cut.

MESENTERIC HERNIA.

A, ascending colon in wall of sac; B, artificial opening in the sac; C, parietal peritoneum; D, pericardium; E, left lobe of liver; F, great omentum turned up over stomach; G, transverse colon; H, distended jejunum; I, hernial sac.

(*London Lancet.*)

NEW INSTRUMENTS, ETC.

Drainage.—R. T. Morris, of New York, ⁶¹_{July 2} to avoid the dangers of hard and soft tubes and of unprotected gauze, recommends wicks of the form here presented. The simplest wick consists of

a little roll of absorbent bichloride gauze, around which is wrapped a couple of thicknesses of Lister's protective oiled silk. The gauze protrudes a trifle from each end of the cylinder, and a few little holes snipped through the protective allow serum to reach the gauze elsewhere. In certain cases, where injections through a tube are desirable, the soft-rubber tube can be surrounded with this wick. When a large gauze packing for the pelvis is needed, an apron of the silk can expand out over the gauze and protect



Simple wick.



Tube and wick.

Apron and wick.

MORRIS'S ABDOMINAL WICK.
(*Journal American Medical Association.*)

against intestinal adhesions. The wick acts by capillary attraction; the silk wrap will not irritate the peritoneum, and the whole thing is so soft that it adapts itself to curves readily, and he doubts if it will cause fæcal fistulæ. The end of a wick which projects at the external opening of the wound should be covered with enough absorbent cotton or gauze to hold all fluid that is coming from below. Placed in a pan filled with water, a row of these wicks will empty the pan in a few moments by siphon action. They would empty it almost as quickly if each one led up into a

bunch of absorbent cotton or gauze. A little wick as big as a lead-pencil will take pints of fluid out of the abdominal cavity and transfer it to the absorbent medium outside. When the wick is at work it is important for the patient to remain upon her back; for if intestines are not inflated with gas the fluid rises naturally to the anterior abdominal wall, instead of settling, as many surgeons suppose, in the region of Douglas's pouch. If the patient turns upon her side the fluid, rising to the highest point, will be out of reach of the wick. The relative positions of peritoneal exudation or of blood-serum and intestines will vary with the amount of gas in the intestines; but ordinarily, immediately after work upon abdominal contents, it may be observed that all free fluid is rising toward the anterior abdominal wall; and that is why little holes are snipped through the silk of the wick at various points.

Clamps.—J. Kocks, of Bonn, ³⁹²_{July} ¹⁰¹_{Sept.} regards the clamp as far preferable to the ligature in ligation of the pedicle after extirpation of abdominal tumors. Its advantages are as follow: 1. As a styptic measure the clamp is much more certain than other procedures. 2. It materially shortens the duration of the operation, requiring less time than any other method of ligation, and thus lessening the dangers from prolonged anæsthesia and infection. 3. By its use the operative technique is much simplified. 4. Parenchymatous hæmorrhage is as readily prevented as arterial. 5. Steel clamps can easily be rendered aseptic,—much easier than porous organic ligatures. 6. After the lapse of forty-eight hours the clamps can be removed from the abdominal cavity, and hence no foreign bodies are left in it as in other methods of ligation. At the same time the protracted suppuration frequently resulting from elimination of the ligatures is prevented.

Needle.—T. J. Crofford, of Memphis, Tenn., ⁷⁷⁹_{Sept.} introduced a needle, intended more especially for abdominal work, but also useful in many other operations. It differs from other needles in having a length and curve adapting it to putting in both sides of the abdominal stitches at one stroke or movement. It is threaded loosely with sterilized silk. (Fig. 1.) It is passed down through one side or flap and then up through the other. It is now withdrawn one-fourth or one-half inch, when the thread will open as a loop for the reception of the suture, which the assistant puts in place. (Fig. 2.) The needle is then withdrawn, bringing with it the

suture. (Fig. 3.) The remaining stitches are similarly introduced, one after another, in rapid succession. The handle is large, and affords a firm grasp. The author has used it in more than

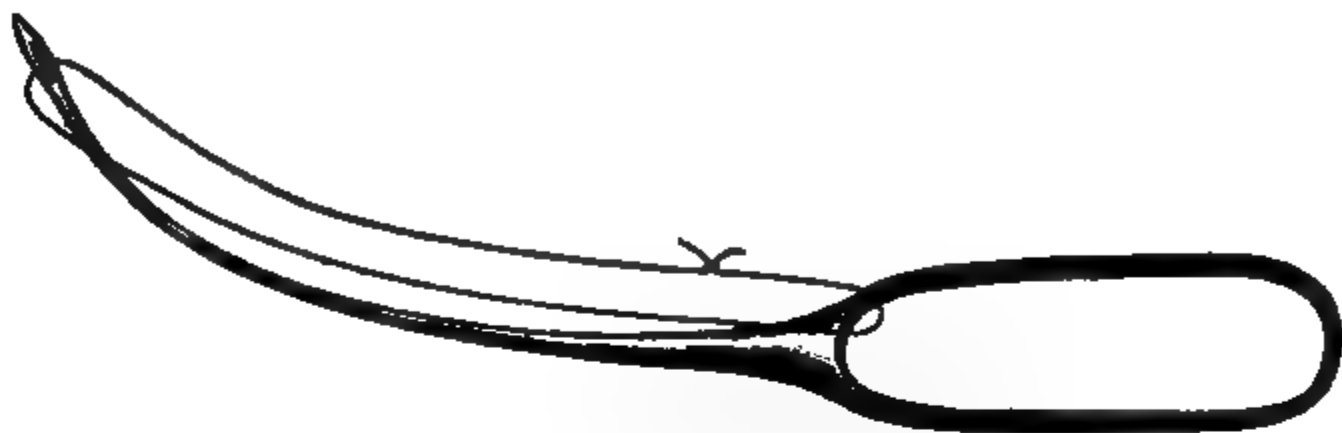


FIG. 1.—CROFFORD'S ABDOMINAL NEEDLE.
(*North American Practitioner.*)

20 cases, and desires none other. It is very useful as a pedicle-needle, in that ligatures of any size desired may be drawn through by it. It is almost equally applicable for amputations and the closing of larger incisions. The advantages are, that it is easier for the operator, approximates the flaps better, and saves time, which is a *desideratum* in obviating oncoming shock.

FIG. 2.

FIG. 3.

Tables.—W. H. Boone, of Shanghai, China,²³⁵ describes a new and easily cleaned table, and Willy Meyer, of New York,⁵⁰ gives a description of Trendelenburg's table, designed for operations in the posture bearing his name.

Enterotome.—Chaput, of Paris,³ contributes a new enterotome, which presents many advantages over Dupuytren's. It is much smaller and lighter, and it does not require daily tightening; it cuts along the entire length of the part seized, and gives rise to much less pain.

DISEASES OF THE RECTUM AND ANUS.

By CHAS. B. KELSEY, M.D.,

NEW YORK.

HÆMORRHOIDS.

Thomas⁶ formulates the following rules for the medical treatment of hæmorrhoids, and feels "very confident that the majority of cases of hæmorrhoids we meet with, some of which we treat with medicine, others by operation, are entirely preventable, and that many of those even which are far advanced can be cured by medical treatment alone." In his remarks he refers to both internal and external hæmorrhoids, but more particularly to the internal.

"Daily Action of the Bowels.—Owing to hurry, many sadly neglect the bowels, which act very irregularly. It is very important that they should be trained to act once a day from childhood, say, immediately after breakfast, and those who have paid proper attention to this rule but seldom require treatment. Sponging the anus and surrounding parts with soap and cold water is a very efficient application. Acrid fluids, etc., which, during the ensuing day, would irritate the skin, are removed.

"Diet, etc.—In this country, as a rule, we eat far too much meat and too little vegetable food. I am confident that this habit has much to do with the costive state of the bowels and the formation of hæmorrhoids. I have seen cases of hæmorrhoids with constipation cured by such attention alone; by taking apples or pears after breakfast; by increasing the quantity of cabbage, cauliflower, etc., taken with dinner and with luncheon; and by, at the same time, diminishing the amount of meat eaten.

"Exercise.—I believe that this is a most important cause, and that, if a reasonable amount of physical exertion were undergone by the nation generally, constipation and hæmorrhoids would very seldom require treatment, the liver would be well kneaded daily,

inspissated bile would be propelled, and the action of the intestines would be assisted by the abdominal muscles.

“*Injectiōns.*—It is astonishing how much relief some patients obtain by an injection daily of as much water as can be retained for four or five minutes with comfort. I generally begin by recommending lukewarm water, but as soon as the patient can bear cold I order it. This seems to stimulate the whole bowel from above downward, to act as a tonic on its interior by daily removing large masses which lodge in the rectum, to enable its walls to regain their elasticity and contractility, and, by removing irritating secretions and pressure, to prevent hyperplasia of cellular tissue, which accompanies a dilated condition of veins.

“*Alcohol.*—Those who suffer from hæmorrhoids should, if possible, give up taking stimulants entirely, for they tend to produce a dilated condition of vessels everywhere, and, by causing disease of the liver of an obstructive character, give rise to dilatation of all the small branches of the vena porta, and those of the rectum suffer more than any.”

I have quoted these rules entire, because they embody so much that is good, and because, by following them, a patient with well-developed internal hæmorrhoids will obtain all the relief obtainable without more radical and local treatment. I must, however, object *in toto* to the author's conclusion, “that nearly all cases of hæmorrhoids, both internal and external, can be cured by proper, simple, rational medical treatment.” Nor have I found any such close relationship to exist between hæmorrhoids and constipation as the author lays down. In my own experience, I have operated upon fully as many whose bowels were absolutely regular as upon those who were constipated. There is no doubt, however, that, the hæmorrhoids being present, one of the most efficient ways of keeping comfortable is to have a daily, regular evacuation. This, in itself, may prevent inflammation and strangulation, but it does not cure.

Operative Procedures.—Allingham, Jr., says²²_{July 22}: “I very rarely employ the following operation, but the fact that it is in general use by some surgeons compels me to mention it. The pile is drawn into a clamp, the distal portion is cut off, and the stump within the clamp is cauterized till all the vessels are thoroughly seared. I have several reasons for not using the

clamp and cautery, except in a few special cases. Statistics show that it is quite six times more fatal than the ligature or crushing; the burning gives great pain after the operation, as is the case with all burns; hæmorrhage is more likely to occur; there is greater sloughing of the rectal tissues; more time is required for healing; and further contraction is common, as with all burns. I only use the cautery (without the clamp) in cases of pure capillary piles, where there is no tumor, but merely a very vascular localized area."

This reads very familiarly. I distinctly remember it in the older editions of the book of Allingham, Sr. The author says he only mentions this method because its general use by some surgeons compels him to. Does he know how general that use has become in the last few years, and the names of those surgeons who are so rash as to prefer the clamp to the ligature, even though "at least six times as dangerous"? The "statistics" which show this mortality were gathered by Allingham, Sr., and demonstrate the old saw "that nothing lies like figures except facts." They consist in showing how many times he has operated by the ligature without a death, and offsetting that against all the deaths he could find, the world over, after the clamp in the hands of anybody who cared to use it. By exactly the same class of statistics, carried a little further toward the absurd, I am prepared to prove that the ligature is at least not six, but sixty times as fatal as the clamp, for the mortality and accidents in my own practice with the latter are zero, and I can find many fatal operations with the former. My own statistics with the clamp are better than Allingham's with the ligature, for I have never had an accident, and he has; but that proves nothing. If Allingham, Jr., will operate one hundred times with each method, he will probably find the mortality just the same with each, and that mortality will probably be zero. As to the other objections, they are more matters of opinion with the author than facts based upon experience with a method which, by his own statement, he never employs. As matters of fact, the steady growth in the popularity of the operation would seem to indicate that they are not generally accepted.

PROLAPSUS.

Verneuil¹⁰⁰ has invented a new method of treatment for prolapsus, which consists, in brief, in dissecting down upon the rectum

from behind in the median line, gathering it up into transverse folds by sutures in its walls which do not penetrate its calibre, and, after thus sufficiently shortening the tube, attaching it by sutures to the sides of the coccyx and sacrum, to prevent its further descent.

This is one of several of the so-called operations of fixation which are now being practiced for the cure of old and severe cases of this affection, and which form the subject of a review by Gautier.

For the past year they have been substituted, in a measure, for the older methods of cautery and plastic operations, and for the various operations of excision and amputation. The operation of Gérard-Marchand is a modification of that of Verneuil, but is the same in conception; while the operation of Jeannel consists in fixing the sigmoid flexure to the abdominal wall by an incision similar to that of left inguinal colotomy. Good results have been recorded by all of these plans.

FISSURE.

Ball²_{Sept. 12} lays great stress upon the sinuses of Valsalva in the causation of painful fissure.

Many authors have noted that painful fissures apparently commenced in these rectal sinuses, and also that at the lower portion of them there was what is called a small external pile, and have stated that, for the cure to be complete, this pile must be removed, in addition to the usual operation for the fissure. These authors consider that the first cause is a longitudinal slit from overdistension during the passage of a hard motion, or an abrasion from some particularly hard fragment of fæces, and that the presence of a pile, or little cutaneous tag, at its lower portion is only an accidental complication. Ball believes that in a large number of cases what happens is as follows:—

During the passage of a motion, one of these little valves is caught by some projection in the fæcal mass, and its lateral attachments torn; at each subsequent motion, the little sore thus made is re-opened, and, possibly, extended; the repeated interference with the attempts at healing ends in the production of an ulcer, and the torn-down valve becomes swollen and œdematous, constituting the so-called pile, or, as it has sometimes been called, the “sentinel

pile" of the fissure. Most of us have experienced the little bits of skin torn down at the sides of the finger-nail, and how painful they are when dragged upon. The torn-down anal valve resembles closely this condition of the finger, except that in the former it is situated at the acutely sensitive anal margin, and subject to the periodic strain of a passing motion; it is, therefore, not to be wondered at that the pain should be so excessive as to seriously affect the general health and render life miserable.

Admitting this theory to be correct, it is easily seen how the older operations were so successful in affecting cures. First, as to dilatation. When the anus is widely stretched by the fingers beyond the limits of natural dilatation by the passage of a motion, the little valve is torn down beyond the extent to which it is torn in normal defecation, and, consequently, rest is given to the ulcer and healing ensues, the subsequent defecation not re-opening the sore. In the "hang-nails" at the side of the finger, if the little piece of skin is forcibly torn down, although the process is painful, a cure results just in the same way that forcible dilatation cures the anal ulcer. Secondly, complete or partial division of the sphincter, if carried down through this tag, relaxes each side so that subsequent motions do not catch in it and re-open the wound; but most surgeons of experience in this subject have met with cases in which both dilatation and incision have failed, and the advice given by many writers, to supplement the operation by the removal of the so-called pile at the lower end of the ulcer, is undoubtedly sound. Ball, however, goes further, and says that the removal of the little tag is all that is necessary, and that neither the dilatation nor the incision is called for.

What he recommends is as follows: Do not subject the patient to the pain of an extended digital examination, much less occasion him the torture of passing a speculum; but, after having the bowels fully relieved by an efficient aperient, administer an anæsthetic and dilate the anus with the fingers sufficiently to obtain a good view of the entire circumference of the muco-cutaneous junction; then, if the symptoms have been characteristic, a little ulcer will almost certainly be found, and at its lower extremity the torn-down anal valve sometimes greatly hypertrophied. All that is now necessary is to catch this in a forceps, and with a fine pair of scissors remove it, by a V-shaped incision, so

that nothing be left which can be caught by a passing faecal mass. If there is any unhealthy granulation tissue in the ulcer, this should be removed with the sharp spoon and the surface well dusted with boracic acid; the cure will then be immediate and certain.



ONE OF THE RECTAL POUCHES TORN DOWN AND ULCERATED.
(*British Medical Journal*.)

That this pathology may be correct, as regards certain painful ulcers of the rectum, I must agree; but that it accounts for more than a small minority I am not prepared to admit. The "sentinel pile," or valve, as Ball considers it, is present in only a few cases of fissure, and we have no proof that it is the hypertro-

phied valve, or anything more than a tag of skin caused by the irritation of the ulcer. With a thriving quack sanitarium in Chicago, into which whole opera-companies are received to have these valves cut out for the improvement of their voices, we must be excused for scrutinizing very carefully any supposed new influence they may have in the causation of rectal diseases. Probably Ball has not seen and heard much of this peculiar form of quackery on his side of the water. We admit his pathology, with this word of caution, and we predict that the excellent illustration he gives will shortly illustrate many a quack hand-bill on diseases of the rectum.

RECTAL REFLEXES.

J. M. Mathews^{198 Feb.} reports 2 very interesting cases illustrating the reflex effects which may arise from disease of the rectum: 1. Married woman, aged 40, mother of 5 children. For five years had been subject to epileptiform seizures. The attacks occurred at intervals of a week or ten days, the patient becoming semi-conscious or entirely unconscious, but only twice having distinct spasms. For eight or ten years she had complained of hæmorrhoids, and 4 large tumors were ligated. They were ulcerated, and had caused much suffering. Many months have passed since the operation, and there has been no return of the seizures. 2. Widow, aged 35, had epileptic spasms for the last three years. Preceding each attack she had pain on defecation, caused by an irritable ulceration. Free divulsion of the sphincter muscles and scraping entirely relieved her of all rectal disease, since which she has had no attack of epilepsy. Two years have passed since the operation upon the rectum.

Murray^{132 Jan.} calls attention to the frequent association of rectal with other pelvic diseases in women. In a large proportion of the cases coming under the care of the gynæcologist constipation is a symptom which causes anxiety, and certainly, if not the cause, is just as certainly a concomitant of uterine trouble. The inflammatory diseases of the uterus and its adnexæ—tube, ovary, and ligaments—are by far the most frequently seen of all uterine diseases by the specialist. The first symptom present in almost every case is pain in the left side, over the ovary; next, flatulence and constipation. When we remember the anatomical arrangement of the tissues in the left side of the pelvis, particularly the vascular

and nervous supply, we can readily understand the reason why the patient has pain in the left side, and why that pain is associated with constipation and flatulence.

The hæmorrhoidal arteries and veins are closely connected with the portal circulation by the anastomosis between the hæmorrhoidal branch of the inferior mesenteric which supplies the upper part of the rectum and the hæmorrhoidal branches of the internal iliac which supply the lower part; congestion of one circulation means congestion and sluggishness of the other. The rectum, in its descent into the pelvis, goes from the left sacro-iliac synchondrosis to the middle of the sacrum, the ovary and tube on that side being almost in contact with it; a distension of the rectum by faecal accumulation implies a fixity of the uterus, and a congestion of the pampiniform plexus and congestion of the ovary. To relieve this condition we must not rely on hot douches, iodine, or glycerin applications, but relieve the engorgement of the ovarian veins by the emptying of the rectum.

In the lower third of the rectum the pain on defecation, weight, and pressure, as of fullness of the organs, is often experienced by the virgin, due to congestion of the pelvic veins by constipation.

The normal position of the uterus in the virgin is that of slight ante flexion. How very frequently we find the uterus retroverted, causing dysmenorrhœa, colicky pains, and the passage of clots at the menses! We seek in vain for a history of some fall, blow, or other cause of misplacement. There are no adhesions, showing that the position is not due to peritonitis; the only solution of the cause is chronic constipation and pressure due to difficult defecation. Relieve this pressure by restoring the position of the uterus, correct the constipation, which is the cause, and the patient is cured.

In chronic displacements of the uterus, retroversion or retroflexion, this is more fully shown, since the long-continued pressure obstructs the circulation to such an extent that hæmorrhoids result, and the parametritis generally fixes the uterus on the rectum; so that the use of cathartics only excites the inflammatory symptoms anew and makes the patient afraid to take these remedies. Here the uterine symptoms are prominent, but no relief is experienced in her feelings till the communication between the

portal and genital circulations is made more free,—first, by correcting the displacement; secondly, by relieving the constipation, which causes pressure downward of accumulated fæces. This can only be done by the use of enemata.

There is another result of chronic constipation which is often seen, which may, by its symptoms, not only simulate, but also cause uterine trouble,—the enlargement and pouching of the lower third of the rectum. This condition is found very frequently in virgins, and gives the pain in the back, discomfort in standing or walking (more particularly in standing), and the sensations of dragging and fullness, as if the parts would fall. This is due to the distension and varicosity of the vaginal and uterine veins, caused by the formation of a proctoceles, pressing the vagina forward. Efforts in defecation then cause intense pain, pressing the vagina and rectum downward to the pubis and perineum; instead of relieving the patient, however, the traction on the vagina forces the uterus downward, and prolapsus or retroversion results. In this condition, the correction of the retroversion does not relieve the patient, since the cause is not the retroversion, but the rectoceles, due to the constipation. The proper course to pursue is to cure the constipation, when the reposition of the uterus will cure the symptoms.

As a result of constipation and prolapse of the anterior vaginal and rectal wall causing cystoceles and proctoceles, the author has seen several cases where painful fissure of the vaginal outlet was caused, and this particularly in married women who had children. The lacerations, which always occur in greater or less degree in accouchement, had not healed thoroughly, when a distension of the introitus vaginæ was caused by a hard, costive, fæcal passage, which opened the laceration much as a slight fissure on the outside of a rubber band opens when the ring is distended.

These fissures in the vaginal entrance are very painful and intractable, and can only be relieved by curing the constipated habit and correcting the proctoceles by the use of laxatives and enemata. The fissure may even need surgical interference. It is a common idea among women that if the bowels are loose at the menstrual period they suffer less, and I believe, in general, the observation is true; still, cases of parametritis, associated with

disease of the tubes and ovaries, are usually made worse, and an acute attack may be excited by a diarrhoea.

In chronic retroversion, where the uterus is pressed upon the rectum, and in chronic fixation of the uterus, in any position, from pelvic peritonitis, the author has found that with constipation, even without it, many patients complain of a discharge of a glairy mucus from the bowel, with a sensation of burning during and after the act of defecation. This mucous is often stringy and in links, so that, at first sight, it may be mistaken for a tape-worm. Following this, there may be a bloody or a sanious discharge, particularly at the menstrual period. On the relief of this catarrhal proctitis by aseptic injections of boracic acid or mild astringents, as bismuth subnitrate, or oxide of zinc, the complaints of pelvic pain are often relieved; and, though the uterine disease is not cured, it is tolerated by the patient.

Hæmorrhoids and painful fissure are often associated with uterine disease, either inflammatory in nature or due to the pressure of tumors. Where hæmorrhoids are due to uterine pressure, the proper treatment, of course, is the replacement of the organ; where this cannot be done, much may be accomplished for the patient by keeping the bowels regular and relieving the pelvic circulation by rest in bed, the vaginal douche of hot water, and the reduction of the hæmorrhoids by pressure after each act of defecation. It is noticeable that most of the symptoms which patients complain of in prolapsus uteri are the same as those presented in a case of hæmorrhoids, suggesting that the trouble is really the same congestion of the pelvic veins.

Fissure of the rectum is one of the causes of dyspareunia which may be diagnosticated as vaginismus, and efforts made to relieve it by emollients and distension of the vaginal introitus. The cure of the fissure will be quickly followed by relief of the symptoms.

Abscess in the recto-vaginal septum will produce difficulty in defecation, and the patient treated for obstinate constipation, the pain preventing voluntary efforts. Ischio-rectal abscess pointing in the perineum may be diagnosticated as dyspareunia.

CHANCRE OF RECTUM.

Although chancre of the anus is not particularly uncommon, chancre within the rectum is exceedingly rare, if we may judge

from the absence of reported cases. Ricord, Fournier, and Vidal de Cassis each report one, and these are about the only ones previously reported. In Vidal's case, the induration is said to have been so great as to cause stricture,—a statement which must of necessity throw doubt upon the diagnosis. The difficulties attending the diagnosis of such a sore are manifest. Its mere appearance would scarce be conclusive, and the absence of any other sore which might cause general symptoms would need to be fully established, which, in women, is a very difficult thing to do.

The following case, reported by Hartley,²⁴⁵ has every appearance of being authentic:—

“J. McG., aged 32, male, U. S., organist, was admitted to Roosevelt Hospital, September 20, 1890.

“*Family History.*—No tubercular, renal, nor cardiac ailments. No rheumatic history.

“*Personal History.*—No tubercular, renal, nor cardiac disease. Denies all previous venereal diseases. Had dysentery some years ago.

“*Present Condition.*—About three weeks ago patient noticed severe pain at defecation, and a small lump just within the anus; pain now continuous; tenesmus after each passage. Blood has been present at stool at times. He has suffered from constipation for a long time.

“*Examination.*—An ulcer is found just one inch from the anal margin; it is about the size of a quarter of a dollar; the base is indurated and the ulceration is very superficial; sacral glands felt enlarged; there is no evidence of any other lesion.

“*Operation.*—September 20th; F. Hartley; usual antisepsis; bichloride and boric-acid irrigation of the rectum; sphincter dilated; bivalve speculum used. The ulcer is seen just one inch within the rectum; it is superficially eroded, with a distinct but not cartilaginous base; cauterization with Paquelin cautery; iodoform powder. Patient ordered to wards, and to be watched for evidence of constitutional syphilis. September 25th, ulcer healing rapidly. October 1st, roseola over chest and abdomen. October 5th, discharged from hospital improved. October 20th, patient applied for treatment in the out-patient department, stating that his medicine had been used up, and that he desired more. Patient presents a papular syphilide, involving the face, forearm, trunk, and portions

of the extremities; the ulcer of the rectum is healed; patient is put upon antisyphilitic treatment.

“A careful inquiry as to the mode of infection was instituted. Patient for the first time during his treatment here admits that three weeks before his admission to the hospital, while in Baltimore, he was the victim of another man. After this confession the patient was lost to view.”

STRICTURE OF THE RECTUM.

My analysis²⁰⁰¹ of 138 personal cases of stricture, of all varieties, throws some light upon several points in connection with this disease. One is, that it is slightly more common in males than in females, the proportion being 76 of the former to 62 of the latter. This is directly opposed to the statement found, without exception, in the older text-books, that the disease is one almost peculiar to women. Another point which challenges attention is, that of 138 cases, of all varieties, 62, or less than 50 per cent., were cancerous; and, what is more striking, of the remaining 76, only 17 gave any decided evidence of being syphilitic or venereal, 37 are classed as positively non-venereal, and 11 of doubtful nature, but not malignant. These figures do not include the congenital and spasmodic varieties, nor those due to pressure.

Mathews,⁶¹ in his address on this subject before the American Medical Association, criticises this classification, but, we think, without in any way weakening its force or correctness. Indeed, he makes some very remarkable statements,—such as the following: “I wish to re-iterate that, outside of these two well-recognized causes for stricture of the rectum (cancer and syphilis), I am not prepared to admit any other as a well-known, recognized, indisputable cause.” Again: “I have frequently said that I believe that more than one-half of the strictures met with in the rectum were the result of syphilis;” and, “I have often asserted that in no single instance have I ever seen a stricture of the rectum caused by the healing of a soft sore. I do not believe that it can occur.”

Mathews introduces his paper by the plain statement that he takes “positions contrary to the accepted teachings of the day;” and, after reading these quotations, nobody who knows what the accepted teachings are will be at all inclined to dispute the truth

of his assertion that he differs; though we think everybody will deny that his grounds for thus differing have any support, either from pathological study or clinical observation. A writer who boldly ventures to differ from the rest of the surgical world should have strong evidence in favor of his position,—stronger than is conveyed by the statements, “I have never seen”—what other men have seen; “I do not believe”—what the greatest authorities have carefully studied and taught.

For instance, Van Buren²⁰⁰¹ says: “I cannot help thinking that the singular facility with which rectal ulceration may be derived from auto-inoculable sores situated on the female genitals has led many to overrate the frequency of its origin from this source. That it does take place in the lowest class of prostitutes, and not very rarely, my own observation in the Bellevue and Charity Hospitals in former years compels me to believe. I have seen 4 or 5 radiating fissures at the anus, the result of straining at stool, inoculated by vaginal discharges charged with the poison of chronic vaginal chancroid trickling down from the vulva. I have also seen chancroids at the anus become phagedænic and extend within the rectum, and have verified, at a later period, the existence of stricture of the rectum from the cicatrization, as there was every reason to believe, of this same ulceration. I have certainly seen this in several cases, but only in women.”

To those who knew Van Buren, and, indeed, to the whole medical world, his statement that he had certainly seen anything several times would carry great weight. And yet Mathews says: “I have often asserted that in no single instance have I ever seen a stricture of the rectum caused by the healing of a soft sore. I do not believe that it can occur.” Well; there is not much more to be said, except to admit that Mathews differs not from Van Buren alone, but from “the accepted teachings of the day,” as he asserts. Why he differs he does not say,—except that he has never happened to see what others have seen.

Mathews’s individual conviction with regard to the impossibility of chancroidal strictures, though doubtless a matter of great interest, is not nearly as important as his peculiar belief that half of all the strictures are syphilitic; for this he attempts to prove, while the other he merely does not believe.

He says: “I desire to quote from Kelsey the following

statement: 'There is an old and deeply-rooted idea in the minds of the profession that a stricture of the rectum must either be cancerous or syphilitic,—an idea founded on error, and capable of doing much harm and injustice to innocent people. Again and again have I been able to give great comfort to women suffering from this disease by denying the correctness of this idea, and, in my own practice, the fact that a stricture is not cancerous adds little weight to the idea that it may be syphilitic.' ”

“This,” Mathews says, “is so diametrically opposed to my views and observations that I desire to say that, in my opinion, fully 60 per cent. of the strictures of the rectum are due to syphilis. Not venereal, in the sense that many would have us believe, namely, by the infection of the rectum by chancreous pus, or by direct contact, but as a secondary deposit, the result of constitutional disease. By a late estimate, it is calculated that five million people in the United States are subjects of constitutional syphilis. If it is admitted that one single case of stricture of the rectum can result from this constitutional disease, it admits the argument.”

The “argument,” if we understand Mathews, is this: Syphilis, it is admitted, may cause stricture. There are five million people in the United States suffering from syphilis. Therefore, all strictures of the rectum not cancerous are syphilitic. In fact, this author leaves us in no doubt as to his conclusion, for he goes on distinctly to say: “Indeed, so firm am I in this belief, that, if it is a question between cancer and no cancer, and it is decided that it is not malignant, 99 out of every 100 cases will prove to be syphilitic.” We cannot go into all the ramifications of his article, but we must stop to ask him what the hundredth case would be, recalling his earlier statement that, besides cancer and syphilis, he recognizes no other cause.

It is unfortunate that Mathews should try to impress Allingham into service as upholding any such belief as this, for, though there is a deeply-rooted idea in the profession that strictures are either cancerous or syphilitic, I have never before seen the statement boldly put into print and an attempt made to prove it; and Mathews would have done better to have claimed entire originality for his pathology, and have left Allingham's name out, more especially as Allingham distinctly says he believes no such

thing as Mathews is trying to prove and to support by the weight of his borrowed authority.

Mathews quotes Allingham as saying: "Thus, out of a total number of 99 patients, 52 or more were syphilitic." What Allingham does say is this²⁰⁰¹ (and he is speaking of *non-malignant* stricture, not of all strictures): "Thus, out of the total number of 100 patients, 52 (or more than half) were syphilitic. This is a greater proportion than I have seen mentioned before, but, as far as I can ascertain, the truth is as stated. *What causes brought about the ulceration, etc., in the 48 patients (non-malignant) who were not syphilitic?*" The italics and parentheses are my own. He says: "We have propounded some causes, viz., tuberculosis (not so uncommon as generally supposed); dysentery and diarrhoea, usually following prolonged residence in tropical climates; obstinate and long-standing constipation; injuries to the uterus and vagina in parturition; operations on the rectum in persons of bad constitution."

If Mathews can find, in this quotation from Allingham (and it is from this very sentence that he quotes), any support for his belief that all strictures are either cancerous or syphilitic, it must be by a mental process peculiarly his own. Are we to judge that, like the chancroidal ulceration, he has never seen, in his "several hundred cases," any of the kind that Allingham says compose 50 per cent. of all the non-malignant varieties, and which I believe account for more than 50 per cent.; or is it because he fails to recognize them when he sees them, and calmly calls them all syphilitic?

Mathews quotes me as opposed to this idea. I must admit that I take the greatest pleasure in inveighing against and trying to root out an idea founded on error and capable of doing infinite injustice to the innocent, and without the slightest scientific basis; an idea that, in spite of personal friendship for the one who advances it, I cannot allow to pass unchallenged.

In consultation with Bull, I was called to the sick-room of a dying girl, aged 17, suffering from a stricture of the rectum, numerous fistulæ, ulceration, and impaction above the stricture. The etiology seemed perfectly plain,—typhoid fever and relapse; a large fæcal impaction, lasting many days during the fever, and finally dug out with the scoop,—simple ulceration thus

caused steadily progressing to fistulæ and cicatricial contraction. This is, however, the pathology which Mathews denies, and, by denying, "differs from the accepted teachings of the day." To him a stricture not cancerous must be syphilitic, and, when questioned by the heart-broken parents of the dying child as to the cause of such an unusual disease, he must, if he says anything, say: "Your daughter is dying of a loathsome disease, the result of her own vice." This is why I say that this old, popular, and ridiculous idea is founded on error, and capable of doing infinite harm to the innocent. Mathews does not agree with me. I can only regret it.

There are other points in pathology in which Mathews differs from the rest of the world, but none so vital as this; none so capable of doing such harm. One of them is as to the possibility of dysentery being a cause of stricture. He thinks not, and his argument is that neither he nor his friend Ouchterlony have ever seen a case. The only answer is that many others have, and that the fact of its existence is denied by no modern pathologist.

The next important criticism with which Mathews favors my contribution to the study of stricture is on the head of treatment, and here he includes Bryant also. We can easily understand the writer's objections to colotomy. They are certainly no greater than were mine at one time, and yet I believe him to be in the wrong. But he does not stand alone in the wrong, as he does in his pathology, and the whole question is one for serious thought and free discussion. Nevertheless, little is to be gained for science by such an expression as this: "I will be permitted to remark that, in my opinion, it has become too much the custom, or fad, to do this operation in cases where there is no possible chance of doing the patient any good." Colotomy, like amputation, is a confession of powerlessness and failure. We cannot cure the disease of the rectum; we can only shut the diseased part off from the rest of the economy, and let the sufferer go on through life without it. But I have never known a surgeon who had a fad for mutilating his fellow-men by cutting off their legs, nor one who had a custom of inflicting an unpleasant deformity, in the way of an artificial anus, where there was no possible chance of doing the patient any good.

The whole question is as simple as this: Is it the duty of

the surgeon to prolong life, or is he justified in saying, I can prolong life, but I won't, because I don't like colotomy? For no man does like to do colotomies, and no man does them for pleasure. Mathews says: "If there be total obstruction of the sigmoid flexure from a cancerous mass, and if, for any special reason, we wish to prolong life a few days, then I believe colotomy would be justifiable." Since when have doctors reached the point of looking at a dying man and saying they believe it would be justifiable to avert death (not only for a few days, but for months and years), *if for any special reason they wished to?* Mathews has the grace to say he believes the great majority of surgeons will differ from him on this point, but that his conclusions have been reached after careful investigation of the subject.

Mathews says: "Too many people are being subjected to this horrible and disgusting operation that could be benefited equally as much by simpler means." This is a serious charge. Does he know of any such cases of his own knowledge? It is the custom of all men who do colotomies to teach that it should only be done as a last resort, where all other known methods of treatment are either inapplicable or have failed. Does he know of any man who has ever said that colotomy was preferable to dilatation, to incision, to excision, to *anything* else that could possibly give relief, and who practiced it before all these things had either been faithfully tried or were manifestly hopeless and useless? If he does, his reading is wider than mine.

If Bryant has done his 150 cases, Allingham and Cripps each their 100, and I as many cases as have manifestly demanded it, is it because we have a fad for doing it, and have abandoned other plans of treatment? Or is it because Bryant has had 150 cases where colotomy would give longer life and greater comfort than any other known procedure, and the others their proportion? Or does Mathews know of some plan of treatment, by which a colotomy can be avoided, of which the rest of us are ignorant? We find no mention of it. We see dilatation, divulsion, incision, excision, etc., mentioned in his paper; and we say that when all these have been tried and failed, when a patient is dying by inches, or suddenly, in spite of them all, then, and then only, is colotomy to be practiced. Mathews says that we are "justified" in practicing it, if, "for any special reason, we wish to prolong life."

When Bryant says that the operation has been too much regarded as a *dernier ressort*, and, as a consequence, was only carried out when all other measures had been tried and proved to be useless, and that he wishes to combat this idea, and favor its earlier and more frequent performance, we think he does not mean that any other measure likely to be of benefit should not first be tried. In fact, his very next sentence is: "We have regarded it as the best means the surgeon has at his disposal for the relief of rectal obstruction from cancers and every disease *not otherwise removable*, and experience has proved that life may by it be saved when the disease is not cancerous, and prolonged even for years when it is so."

Another point must be considered: Bryant may be a better judge of how much can be accomplished by the older plans of treatment than they who have had less experience, and may hence do his final colotomy earlier and oftener than they. It may be the *dernier ressort* to him much quicker than to a man of less experience. When he feels an ulcerated and strictured rectum in an emaciated and exhausted patient, who has had all of the other methods of treatment, faithfully carried out for years, he may more quickly than another appreciate the futility of all those methods, and say there is but one way of giving this patient relief; that is, colotomy. Why postpone it? Is this doing the operation when other and simpler methods would do just as much good? Is this having a fad for doing the operation in cases where there is no possible chance of doing the patient any good? It seems rather the kind of surgery that makes one man greater than another. This is what all colotomists have taught and are practicing, and not as Mathews's article would lead one to suppose, that colotomy is being substituted for other measures that will do just as much good, relieve pain just as well, overcome obstructions just as effectually, prolong life just as long, because certain men have a fad for the operation.

There is another question in addition to these: Every day we see the words "disgusting," "loathsome," "miserable" applied to the condition of these patients; and Senn, in a recent article, has reached the climax when he says he does not believe that there is a single person living who has been colotomized who had not rather be dead. I have a patient, a little woman, out very near

Senn, whom he ought to see. She says: "If anybody's afraid to have that operation done, send them to *me*." I have been offering to close the artificial anus, the non-malignant ulceration for which it was made being now cured, after many years of suffering and hopeless invalidism, and she says, "Not for a million dollars!" I have done it on physicians, who are now in active practice, and on physicians' wives; on laboring men, who are now earning their living by heavy physical labor, and on professional men high in social life; on nearly all sorts and conditions of patients, and I have never yet had a patient tell me he regretted having it done. Therefore, I know that Senn's statement is an exaggeration, growing from his own idea of what these patients must think, and not from personal experience of what they do think. Does anybody really suppose that it would take a man like Bryant 150 cases to find out whether these patients were as disgusted as Senn thinks they ought to be; and that, if they were, he would go on practicing and advocating the operation, on the ground that the patients were benefited? No man hesitates longer before doing a colotomy than I do, or takes more care to be sure that nothing else can possibly do as much good; but I would hesitate much longer if I thought any patient were likely to turn upon me and tell me he would rather be dead than submit to the operation again. My hospital patients report to me once in six months or a year, and generally the only times I ever see them are when they want advice for something else. I have a favorite way of overcoming the doubts of a patient on whom I am about to operate, and it consists in confronting him or her with a patient on whom I have operated, and letting them talk together half an hour; and these, it must be remembered, are the general class of cases of which Mathews speaks when he says: "But to do a colotomy simply because a patient has a syphilitic stricture of the rectum is, I believe, unjustifiable." I do not know exactly how to make this last statement tally with one which follows later, and which is: "Is colotomy to be recommended as a procedure in the treatment of stricture of the rectum? I answer, unhesitatingly, yes,—when the disease is in the movable part of the gut and threatening obstruction. In benign or syphilitic strictures the patient will live to thank you for the colotomy." And yet the colotomists, the men who have the fad for operating where

it can do no good, are going down into the peritoneal cavity and resecting these very strictures rather than do the operation of which they are so fond, because they believe that any measure of which the mortality is not too great, by which the same amount of good can be accomplished, is better than a colotomy.

Two or three operators during the past year have called attention to the fact that, in some cases, after doing a colotomy and opening the gut, the fæces have escaped from what was supposed to be the lower and distal orifice, but what was in reality the proximal end; the gut having been stitched to the surface in the reverse position, so that when opened the proximal end was below. This is a little startling when first encountered, but is in reality a matter of very little, if any, importance. If the gut presents in the incision and is fastened to the wound as it lies, the probability is that the upper opening will be the proximal one. But if a search has to be made, and the gut is drawn out of its position, somewhere away from the wound, and then fastened, the operator cannot be sure, without a good deal of trouble, that it will not be stitched in the reverse position. In the operation as done by the English surgeons and by myself the matter is of no importance, but in the operation which consists in dropping one end of the gut into the pelvis it is manifestly of great importance to know which end is being closed and dropped.

The following case by Lane,⁶ should be read in connection with Senn's belief that every patient who has had colotomy had rather be dead than alive. It is entitled "Incontinence of Fæces, Following Phagedæna, Treated by Inguinal Colotomy; Relief." And the author says: "The most distressing feature of the case was complete incontinence of fæces, which prevented the patient from moving about or undertaking any duties. Whenever she rose from the sitting posture there was an escape of liquid fæces, in consequence of which she was shunned by her fellow-patients, and her life was one of abject misery and enforced solitude."

This is a very good description of the popular conception of the condition of the patients who have been operated upon by colotomy, and yet for this condition Lane deliberately does colotomy,—an entirely unjustifiable procedure, if Senn's idea is correct.

The condition of the patient five months after the operation

was as follows: "Her general appearance had greatly improved, and she was in the best of spirits. She was wearing an abdominal belt, with a plug projecting into the artificial anus; the bowels were opened regularly once a day; there was scarcely any prolapse of the mucous membrane, and no passage of fæces by the aperture in the perineum."

Further, Lane says: "The operation was one of expediency. The condition of the patient was a very distressing one; still, it was not one that would endanger or shorten life, and the only object of the operation was to enable her to resume her household avocation, by ridding her of the intolerable annoyance to which she was subjected by the constant escape of fæces. It was with a feeling of considerable responsibility that I undertook an operation which can hardly be said to be devoid of danger, and it is a matter of congratulation to me that the proceeding has been fully justified by the result."

There could hardly be a better answer to Senn, and many others, than is furnished by this case; and all those who have done or seen any number of colotomies know that this case is not exceptional, but is a good example of the general rule. It is for this reason that men do colotomies,—not to render patients objects of loathing to themselves and their acquaintances. One of my recent cases, a lady, walked to my office, on first going out-of-doors, four weeks after the operation. From my office she went to Delmonico's and lunched with a couple of hundred other ladies. After lunch she went to a *matinée* and returned to her home, a distance of three miles, for dinner, having been away from home and having had no attention for seven hours. It seems useless, however, to cite these cases, for the popular idea is deeply rooted, and can only be corrected by time and evidence.

EXTIRPATION.

Richelot¹⁷ gives an exceedingly conservative review of the operation of extirpation by the sacral method, based upon his own experience and the reports of others, and formulates several distinct propositions which need only to be stated to be accepted. It is true that in Germany, the birth-place of the operation, it has been many times undertaken in a class of cases which, it would seem, might better have been treated by a colotomy,—cases where

all the perirectal pelvic tissues were involved,—and it is for this reason no doubt that the mortality has been so high. Richelot estimates, however, that the mortality should be *nil* or insignificant when the operation is done under acceptable conditions, and this because the operation is an open one in which the surgeon can see what he is doing, knows where he is going, can secure hæmostasis and antisepsis, and does nothing in the dark, as is necessarily the case in the perineal operations. But if the sacral method had no other merit than to tempt the audacity of the surgeon who loves great operations, and who always wishes to go further and higher, it should be accepted with great reserve. If it only permitted the daring of dangerous palliative interference against cancers which are inoperable, it would have the very limited value of most of the operations of that sort, especially on the rectum, uterus, and tongue.

If, on the contrary, it is applied as it should be, only in the operable cases (those which can be removed in their totality), then its superiority is undeniable. The incision commences in the median line below the coccyx and ends opposite the middle of the sacrum, inclining slightly to the left. The coccyx is enucleated, and a portion of the left side of the sacrum is removed with cutting forceps. This portion may be subsequently increased, if necessary. Then through the cellular tissue the rectum can be directly approached, the numerous vessels being ligatured as they are encountered. The tumor is explored through the rectal wall, its limits recognized with the finger; the intestine is opened, and all the diseased parts removed in fragments, separated with care from the prostate or vaginal wall; the peritoneum is either spared, opened by accident or by design, and closed with sutures, and the upper extremity of the gut is brought down and approximated to the lower. The operation is slow, and may require two hours in performance, but it furnishes all the precision which can be required in any procedure.

The mere description of the operation brings out the striking contrast with the old method of proceeding blindly through the perineum. This is really only adapted to localized tumors, which can easily be surmounted, and in such cases the results are exceptionally good as regards relapse. The advantages of the sacral incision may be briefly enumerated as follows:—

1. To dissect methodically cancers situated high up, and preserve the sphincters.

2. To completely remove cancers distinctly circumscribed, but which would be inoperable by the older methods, their upper limit being beyond the reach of the knife.

3. To preserve, in whole or in part, the external sphincter, even when the rectum is involved low down.

4. To avoid the formation of a cloaca, even when the recto-vaginal septum is invaded by the disease.

5. To attack recurrent growths while yet limited, and give to the sufferers one more chance of health.

6. Finally, to render more easy and precise the extirpation of non-malignant strictures.

The extirpation of non-malignant strictures by the sacral method is growing in favor, and has much to recommend it. (Richelot, Van Hook¹⁷_{Mar. 18}).

In deciding for or against it there are several considerations which will assist in reaching a proper conclusion. It is, first of all, an operation to be undertaken after incision and dilatation have failed to give relief. In these cases, where we are forced to choose between colotomy on the one hand and extirpation on the other, we must be guided, in great measure, by the extent and location of the disease and the possibility of preserving the sphincter. In many cases of non-malignant stricture the operation of extirpation will be found fully as formidable as in cancerous growths, and it will be impossible to leave a useful anus. In such the operation of colotomy is to be preferred for the simple reason that an artificial anus in the groin is very little more of an annoyance than one in the perineum, and can be obtained with none of the risk which attends an extensive resection. It is on this basis that I have been reaching a decision as to which line of operation to follow for some time. Given such an amount of disease as renders the prognosis of extirpation fairly safe and the prospect of preserving the sphincter good, and the results of extirpation will, in some cases, far surpass those of any other method of treatment known. But in another class of cases, where the operation has been formidable and the result has been faecal incontinence, it has seemed as though the results of colotomy would have been fully as good and the risk much less.

In a clinical lecture at the Post-Graduate Hospital, I_{June 27}¹ have endeavored to throw some light on the difficult question of diagnosis, in cases of ulcerative disease and possible stricture of the part of the rectum beyond the reach of manual examination; and, in an analysis of 750 cases in private practice, I_{Sept.}⁵⁰ have tried to give some useful hints to the general practitioner.

SURGICAL DISEASES OF THE GENITO-URINARY APPARATUS IN THE MALE.

By E. L. KEYES, M.D.,
AND
EUGENE FULLER, M.D.,
NEW YORK.

DISEASES OF THE PENIS.

Prepuce.—P. Thiéry⁷ presents 3 cases of valvular formations of the preputial mucous membrane, evidently congenital. (See figures.) This anomaly was found 3 times in the examination

VALVULAR FORMATIONS. (Bulletin de la Société Anatomique.)

of several thousand cases at the Hôpital du Midi. The same author, in a series of articles,⁵⁵ sets forth his operative practices in adult circumcision in a clear and forcible manner.

Balanitis.—Berdat and Bataille⁸¹ describe a form of balanitis, which they have named *la balanite circonée*, and which they consider venereally contagious, although they have not been able to

(E-1)

demonstrate the analogous condition in the female. This balanitis, the nidus of which is chiefly, if not wholly, confined to the glans penis, is considered to be etiologically parasitic.

Hypospadias.—Karewski, of Berlin, ²⁰⁵¹_{Apr. 14} by means of a series of 8 operations, built up a serviceable urethra in a case of perineal hypospadias, which was so pronounced that the individual at birth had been classed as a female. The child at the time of operation was 9 years old. This case is valuable, as it shows what can be accomplished by perseverance in these distressing conditions.

DISEASES OF THE TESTICLES.

There is very little to report this year under this heading.

Misplaced Testicles.—Félizet, ³_{Nov. 11} recommends, in case of partial descent of the testicle where there is severe neuralgic pain, excision of the cremaster muscle and detachment of its fibres from the spermatic cord. The testicle can then be brought down, and kept there by narrowing the external abdominal ring by suture.

Hydrocele.—Robert W. Lovett, of Boston, ⁹⁹_{Dec. 12, '90} in a well-digested article on hydrocele in children, concludes, after quoting many authorities, that the majority of cases of infantile hydrocele cannot be demonstrated to communicate with the abdominal cavity, and that such cases have a strong spontaneous tendency to recovery. As a result of study, the value of this article is exceptional. The personal tendency, however, of the junior editor leans toward interference in these cases rather than toward waiting for the slower cure to be expected from nature. This conclusion is based upon the senior editor's uniform habit of interfering after a few weeks. Then, no matter what the age of the patient, if nature proves tardy in effecting absorption, and the sac does not communicate with the abdominal cavity, a cure can be absolutely attained with no risk and practically no discomfort to the patient. The curative method followed by Keyes is simply this: Insert a rather large-calibred, short, hypodermatic needle unattached to the syringe into the sac. Through this allow all the fluid in the sac to drain away (aspiration is unnecessary), and then, into the emptied sac through this needle, by means of the syringe, which is now attached, throw in 2 minims (0.13 gramme) of chemically pure carbolic acid, liquefied by glycerin (about 5 per cent.), and leave it there. In Keyes's experience every child so operated on

gets promptly and radically well without any disagreeable complications.

Tubercular Testicle.—Humbert¹⁴_{Aug. 16} records himself, together with other authorities, as against castration in tubercular diseases, and in favor of the curette. The junior editor is thoroughly opposed to castration in these cases. Some time since the senior editor removed, by means of the curette, the whole epididymis. A section of the spermatic cord being then found to be extensively ulcerated, an inch and a quarter of that was removed. The function of the testicle had been already destroyed by cheesy foci along its course, and the patient knew that he was practically castrated before the operation was undertaken, but he was much more pleased with the result than if the testicle had been taken away. Perhaps he felt that it was better to assume a virtue if he had it not. The wound healed rapidly by first intention, the relief to the patient being complete. W. H. Bennett⁶_{Mar. 7} relates several instances where the spermatic vessels and cord have been divided, generally in operations for hernia, without impairment to the nutrition of the testicle. He is of the opinion that wasting or sloughing are not to be expected in such instances.

SEMINAL VESICLES.

Jordan Lloyd, of Birmingham,⁶_{Oct. 21} in an article entitled "Spermato-Cystitis," holds that inflammation of the seminal vesicles is one of the common complications in gonorrhœa; commoner, in fact, than epididymitis, and generally coincident with that condition. The author considers that a large proportion of the cases which are usually classed as prostatitis are properly vesiculitis. In suppuration of the vesicles incision or aspiration through the perineum is advised. In case of aspiration, the finger in the rectum is the guide to the needle as it is pushed through the perineum.

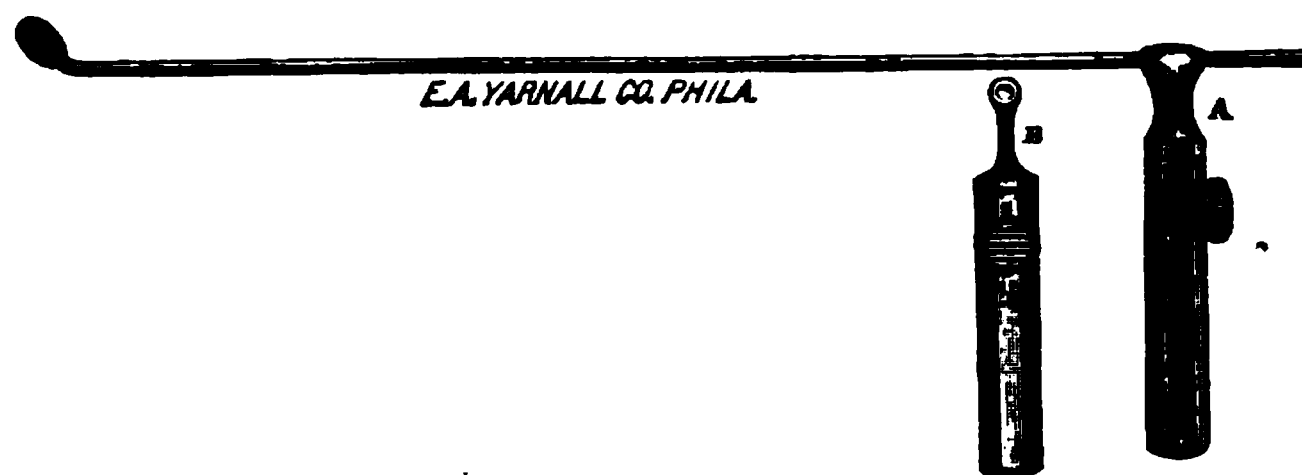
Extirpation of the Seminal Vesicles.—Roux, of Paris,⁸_{Apr. 8} in an attempt at radical removal of a tubercular focus, has twice removed the seminal vesicles, together with the corresponding cord, and testicle. He makes a lateral perineal incision, and dissects his way between the prostate and rectum. A finger in the rectum then brings the vesicle down into the wound, where it is grasped, drawn forward, and excised. Villeneuve, of Marseilles,⁸_{Sept. 23} has

removed the seminal vesicle through the inguinal canal. He opens first the tunica vaginalis, and works his way up to the canal, following the cord. He then pulls on the cord, as one does on the round ligament in Alexander's operation. In this manner the vesicle is brought to view and excised. These extirpations are interesting as surgical procedures. Whether the tubercular focus can be eliminated by these radical measures is still a doubtful question.

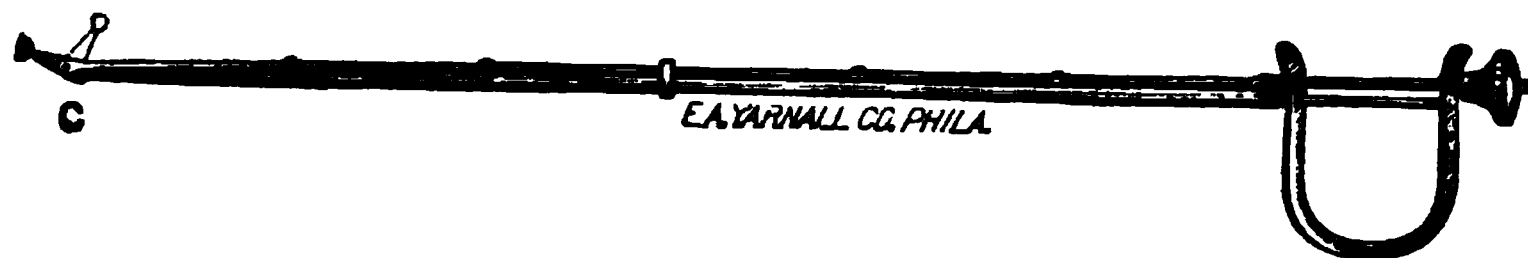
DISEASES OF THE URETHRA.

Malformations.—James Adams, ²_{Jan} reports a case of apparent congenital occlusion of the urethra in a hypospadian infant. The occlusion certainly was not dense, as, after some display of force with a catheter, the bladder was relieved. These cases are worthy of record, owing to their rarity. Of course, if a catheter in such an instance does not readily break through the occlusion external section is called for.

Urethroscopy.—F. Tilden Brown, ²⁴⁵_{July} after reviewing urethroscopy to date, calls attention to his urethral mirror and digit,



F. T. BROWN'S URETHRAL MIRROR WITH SELF-ADJUSTING SPRING HANDLE.



F. T. BROWN'S STRAIGHT SIX-INCH URETHRAL DIGIT.

C, the movable probe-tip controlled by U-spring and thumb-screw at handle. Inch-marks are indicated along the upper rod. (*Journal of Cutaneous and Genito-Urinary Diseases.*)

instruments to be used in connection with his urethral speculum, a description of which latter instrument appeared in the ANNUAL of 1890. The mirror reflects as a laryngoscopic mirror does. When the urethra is put on the stretch by the speculum the tip of the digit readily detects the stricture. These instruments are ingeni-

ous, and are claimed by the author to be important adjuncts to urethral diagnosis.

Papillomatous Urethritis.—With the more general introduction of the endoscope these cases, which formerly were classed among the now rapidly disappearing group of incurable urethrites, are seemingly becoming quite common. The removal of these growths through the medium of the endoscope is, as a rule, not difficult, and the cure is complete. H. Goldenberg, of New York,¹ presents 2 interesting cases of this condition.

Gonorrhœa.—Neisser, as a result of experiments in his clinic, according to J. T. Blackburn,¹⁹⁸ has found that solutions of nitrate of silver are more destructive to the gonococcus than any other of the many agents he has tried. He begins, in cases of acute gonorrhœa, with solutions of nitrate of silver (1 in 4000 to 1 in 2000). Injections of this strength are made from 4 to 6 times daily at first. During convalescence 1 injection a day is given. For the first few days the discharge increases. It then becomes watery, and contains more epithelium, the gonococci rapidly disappearing. In a few cases solutions of 1 to 4000 cannot be well tolerated, and a lighter strength must be employed. Guyon⁸²⁷ also testifies most decidedly in favor of the antiseptic properties of solutions of nitrate of silver. (See article on the bladder.)

Samuel Rona⁵⁵⁹ advocates treating posterior urethritis by forcing medicated fluid from an irrigator, with a nozzle applied to the meatus, through the entire urethra and into the bladder. The editors experimented with this method some years ago, but the results were poor when compared with those attained by the more accurate placing of the medicament by means of the deep urethral syringe. Keyes,⁵⁹ in a paper entitled "Some Practical Suggestions for Deep Urethral Medication in the Treatment of Posterior Urethral Catarrh," calls the attention of the profession to the value, in this region, of the sulphate of thallin, which he uses in a watery solution. A 3-per-cent. solution of this drug is the strength employed at first. This strength can be increased gradually to the saturation-point,—24 per cent. Keyes places great reliance on this drug in the acuter forms of inflammation, except in acute gonorrhœal cystitis, where nitrate of silver has the preference. The effect of the drug is soothing and non-irritant. A separate, deep, urethral syringe should be set aside for the drug,

as it forms a precipitate, especially with nitrate of silver, which is apt to clog the instrument. In this same article the uses and value of nitrate of silver, sulphate of copper, and glycerole of tannin are set forth.

Persistence of the Gonococcus in Urethral Discharges.—Goll,²¹⁴_{Apr. 16} in an instructive article on this subject, presents the following table as the result of his investigations:—

| Time that Has Elapsed Since Infection. | No. of Cases. | Gonococcus Found. | Gonococcus Not Found. | Per Cent. Cases With Gonococcus. |
|--|---------------|-------------------|-----------------------|----------------------------------|
| 4 and 5 weeks. | 85 | 40 | 45 | 47 per cent. |
| 6 weeks. | 54 | 21 | 33 | 38 “ |
| 7 weeks. | 35 | 11 | 24 | 31 “ |
| 2 months | 75 | 15 | 60 | 20 “ |
| 3 months | 76 | 13 | 63 | 17 “ |
| 4 months | 62 | 13 | 49 | 21 “ |
| 5 months | 43 | 8 | 35 | 18 “ |
| 6 months | 55 | 8 | 47 | 14 “ |
| 7, 8, and 9 months . . | 108 | 21 | 87 | 19 “ |
| 1 year | 83 | 12 | 71 | 14 “ |
| 1½ years. | 76 | 7 | 69 | 9 “ |
| 2 years | 135 | 7 | 128 | 5 “ |
| 3 years | 80 | 2 | 78 | 2½ “ |
| 4 years | 37 | 0 | 37 | |
| 5 years | 20 | 0 | 20 | |
| 6 and more years . . . | 22 | 0 | 22 | |
| Total cases | 1046 | 178 | 868 | |

Geo. E. Brewer, of New York,²⁴⁵_{Mar.} reports a case where gonococci were found and contagion followed marriage six years after infection. It is impossible to generalize in these cases, but still it is well to raise a note of warning.

Stricture.—The electrolysis furor in the cure of stricture seems to be dying out, judging from the lack of length and positiveness of the articles which have appeared this year.

J. William White, of Philadelphia,¹¹²_{Mar.} in a well-written article, reviews the modern literature of stricture of the male urethra, and draws his own conclusions as to treatment. G. Buckston Browne, of London,²⁶_{May 1} in an article on difficult catheterism, gives many points which one would do well to bear in mind in these cases. Keyes²⁴⁵_{Nov.} records a successful case of excision of stricture and urethroplasty, the graft being taken from the mucous-membranous portion of the foreskin. The cure, at the end of a year and a half, seems to be complete. Simple excision of the stricture, where the area diseased is not extensive enough to prevent the bringing

together of the healthy ends of the urethra by sutures, is now a rather common and, as a rule, satisfactory procedure. W. Frank Glenn, of Nashville,⁸⁶ records 2 cases where alarming constitutional symptoms followed the simple injection of a solution of cocaine into the urethra. William F. Fluhrer, of New York,¹ introduces a new urethrotome, for which he claims accuracy in the detection, measurement, and cutting of strictures. He has also devised a modified instrument for strictures of very small calibre. G. Wackerhagen, of Brooklyn,¹ and H. W. Rand, of Brooklyn,¹ both in an endeavor to locate stricture with the urethrotome, have suggested attachments to or modifications of Otis's instrument.

W. Page McIntosh, U. S. Marine Service,¹ publishes tabular statistics, which go to show that urethral stricture, as a consequence of gonorrhœa, is not so common among negroes as among whites. A. von Frisch⁸⁷ publishes a seemingly very clever plastic



operative procedure for cases of artificial or natural hypospadias. Between the outer opposing edges of the glans penis he moves up and secures by suture the quadrilateral piece of prepuce which he has dissected up. Figs. 1 and 3 represent this procedure perfectly. Fig. 2 is intended to represent a profile section through the region operated on, showing that at the lower part there are two layers of tissue. Von Frisch advocates the thorough division (thereby making an artificial hypospadias), and this plastic operation subsequently,

in the case of some extensive strictures in this region. This procedure might be well worth trying in case of some of the troublesome fistulæ which are often found under the frænum, just back of the glans penis, subsequent to some previous peri-urethral abscess. In such a case, however, after making the artificial hypospadias, and before bringing up the rectangular piece of prepuce, the junior editor would dissect out and remove the entire fistulous track. James P. Tuttle, of New York, ^{Oct. 1}₁₈₉₃ advocates local stretching of the urethra at the point of stricture only. He presents an instrument for that purpose.

DISEASES OF THE BLADDER.

Exstrophy.—Vincent ²¹¹_{Nov. 30, '90} reports a case of this malformation very successfully treated by the operative procedure advocated by Segond in the French Surgical Congress last preceding his report. A. Poncet ²¹¹_{Dec. 7, '90} and Berger ³_{Apr. 29} also report especially creditable results by following the Segond method. In Berger's case there was separation of the pubic symphysis. The surgeon had also failed to afford relief in this case previously by another operative procedure. Segond's method is to dissect, free of attachment, the posterior wall of the bladder down to the openings of the ureters. Then he folds forward this dissection, bringing the posterior and anterior edges of the vesical mucous membrane together. These edges, after being denuded, are stitched together, a small space being left free in the middle. A urinal can subsequently be fitted to catch all the drip. The great advantage that this operation presents is, that all the inner walls of the newly formed receptacle are of mucous membrane, and consequently there is not the constant tendency to the formation of calculus which is seen after so many other plastic procedures.

Cystoscopy.—The advantages to be derived from the megalo-scope of Boisseaux de Rocher are still being vigorously vaunted in France. The great claim for the instrument is, that it brings to view a very large surface of the bladder at once, while with the cystoscope it is necessary to continually turn the instrument to bring more than a small area to view. The great disadvantage, however, with a megaloscope is, that the field of vision, although large, is so reduced in size as to make objects indistinct. The instrument, also, is not so easy to manipulate as those of Nitze

and Leiter. Reports of the accurate diagnosis of many obscure and interesting conditions by the aid of the cystoscope have appeared during the year.

Rupture of the Bladder.—A. T. Cabot, of Boston,⁹⁹_{Oct. 16} in an excellent article, recommends, in cases where an extra-peritoneal rupture is made out, but where the course of the consequent extravasation of urine cannot be determined, immediate laparotomy, in order to inspect the pelvic region, and thus easily and certainly to ascertain the exact focus of infiltration. The abdominal opening is then closed and a suitable incision, external to the peritoneal cavity, is made to drain off the effusion. The writer also advocates, in cases where there is a doubt concerning the intra- or extra-peritoneal nature of the injury, immediate laparotomy. To drain these extra-peritoneal effusions, in cases where the track of the extravasation extends between the loose pelvic faciæ,—the only one whose drainage presents difficulties,—the incision used for tying the common iliac vessels is recommended. Should this iliac incision not succeed, where the infiltration is very low in the pelvis, Cabot suggests adopting the incision usually employed in excision of the rectum after Kraske's method. The junior editor does not think this last incision would probably ever be necessary, as he has in mind a case occurring in the practice of the senior editor some years ago, and reported by the former,²⁴⁵_{Apr., '90} where the pelvic portion of the infiltration following a punctured wound through and behind the prostate, and extending into the lowest part of the pelvis, was easily and completely drained by the incision such as one would make to tie the common iliac vessels.

H. W. Allingham,²_{Mar. '90} previous to Cabot's article, in an obscure case of extra-peritoneal rupture allowing the escape of urine, adopting the course since advocated by Cabot, opened the abdominal cavity, and, finding a sausage-shaped tumor extending along the right ureter, closed the abdominal wound and made an incision through the loin, drawing off urinous fluid. Recovery followed. Here the rupture was supposed to be in connection with the ureter.

Schlange⁹⁹_{Sept. 10} reports a case where a wagon-wheel passed over a man 34 years old, whose bladder was full, causing both an intra- and extra-peritoneal rupture, no bones being broken. Operation was performed by an abdominal and supra-pubic incision. The abdominal cavity was cleansed in the usual manner, and the intra-

peritoneal rents closed, the supra-pubic opening into the bladder alone being left open for drainage. The patient made an uninterrupted recovery. Rosenbaum, of Tiflis, ⁶_{Nov. 20} and R. Menger, of San Antonio, ¹⁴³_{Sept. 1, 70} both report recoveries, after laparotomy, from abdominal stab wounds penetrating the bladder through the peritoneum. Rose ⁴_{Dec. 1, 70} also reports 2 cases of recovery, 1 being an intra- and 1 an extra-peritoneal rupture.

J. Englisch ⁸⁴_{Oct. 17, 94, 21} has written a very instructive and literary article on idiopathic inflammation of the perivesical connective tissue in the cavity of Retzius. This article is mentioned here for the reason that a thorough understanding of the pathology of this space is so important, especially in the study of extra-peritoneal rupture.

Stone.—G. Buckston Browne, of London, ⁶_{Apr. 24, 95} is the author

FIG. 1.

FIG. 2.

VESICAL CALCULUS.

FIG. 1—A, piece of bogle showing course of prostatic urethra. B, bladder wall, behind the interurethral ridge (C). Cal. the nine apiculate calculi in post-prostatic pouch; D, the intra-vesical prostatic growth; P, the prostate. FIG. 2. Partly diagrammatic, to show how in this case a lithotrite (S) introduced through the urethra failed to reach the calculi.

(*London Lancet.*)

of a very instructive illustrated article on the post-prostatic pouch in the surgery of vesical calculus. Browne, by means of the cases he records, shows that, in enlargement of the prostate where this pouch is deep, it may be absolutely impossible to find the existing stone by means of any sounding instrument passed through the urethra. He also shows that in many such cases the operation of

litholapaxy is impracticable, several of his cases having passed through the hands of distinguished surgeons who had failed to



FIG. 3.—VESICAL CALCULUS.

a, natural size; b, bladder; c, position; d, interureteral ridge.

(*London Lancet.*)

FIG. 4.—VESICAL CALCULUS.

a, natural size; b, side view; c, position; d, bladder; e, interureteral ridge.

remove all the fragments by crushing and washing. Several of Browne's illustrations are inserted here.

FIG. 5.—VESICAL CALCULUS.

A, place of bougie lying in urethra; B, bladder-wall—post-trigonal pouch; C, the calculus; D, intra-vesical prostatic growth; E, the prostate; F F, the vesical openings of the ureters; r r, interureteral ridge.

(*London Lancet.*)

In his case, illustrated by Fig. 1, there were found nine spiculated calculi in the pouch. In the case represented by Fig. 3

the calculus, which was wedged in tightly, formed a perfect cast of the pouch. In Fig. 4 *a* represents the full view, *b* the side view, and *c* the position of the calculus.

The exact condition in all these cases could probably have been determined before operation by means of the cystoscope. Still, in such aggravated prostatic cases as these represent, it is perfectly evident that the supra-pubic opening is called for, whether the cystoscope reveals a stone or not; and, as some of these cases bear instrumental manipulation badly, it often seems to be the best policy to operate, the primary object being to secure drainage without too many preliminary investigations at exactness in diagnosing details, and then to remove the calculus, if one be found, together with the obstructing portion of the prostate, should the strength of the patient seem to warrant this last and radical procedure. L. Bolton Bangs, of New York, ¹_{Aug. 15} reports several interesting cases occurring in his practice where, although from the symptoms present stone was suspected, yet the most thorough searching failed at first to demonstrate such a condition. In all these cases excessive vesical irritability existed when they first came under observation. Rest in bed and frequent ablution of the bladder were prescribed, and then, after the parts had become thoroughly relaxed and the active signs of irritation had subsided, a second search resulted in easily touching the elusive calculus. Reginald Harrison, of London, ⁶_{Nov. 14} suggests that, in cases of enlarged prostate, associated with the post-prostatic vesical pouch, where stone is suspected, or, in case of stone, where litholapaxy is attempted, the introduction of Peterson's rectal bag, distended with 2 or 3 ounces (60 to 90 grammes) of water, will facilitate the touching or the crushing of the stone, as the case may be. G. Buckston Browne, ⁶_{Nov. 21} however, publishes a card, in which he states that he has already adopted and reported this idea in a case of lithotripsy. The junior editor has tried this procedure in searching for stone in that class of cases, and approves of it. Sir Henry Thompson, ²_{Jan. 6} in an article entitled "A Modification in the Form of Sound for Finding Small Vesical Calculus," presents a new searcher. The features of this instrument are that it is solid, and therefore cleanly; it has a flat handle, the under surface of which is rough and the upper polished, to show more readily the direction of the beak; it has a small cylinder for facility in rotation; it has a beak

flattened a little in the opposite plane to that of the flat handle, in order to increase the resonance of the instrument on striking a small concretion; its beak makes more of an obtuse angle with the shaft, in order that the instrument may more easily enter the bladder. The accompanying cut illustrates the instrument.

Foreign Bodies.—Samuel Alexander, of New York,²⁴⁵ records a case in which the nuclei of a long-continued series of calculi had all been bits of necrosed bone, which had, from time to time, been discharged through a connecting pelvic sinus into the bladder.

Litholapaxy.—Surgeon-Major P. J. Freyer,² records 165 more cases of litholapaxy with 3 deaths; J. A. Cunningham, Civil Surgeon, Punjab,² 102 cases of litholapaxy occurring in his practice since January, 1890, without a death; Surgeon-Major Gimlette,² 40 uniformly successful cases occurring in boys; C. J. Maher, Civil Surgeon, Punjab,²³⁹ 61 cases and 1 death; F. Swinford Edwards, of London,² 40 cases with 4 deaths. Among the Indian cases are those of many young children, 1 of them being only 2 years old, and several of them but a fraction over that age. Freyer states that the facility with which a No. 6 English cannula will pass through the urethra of these youngest children is astonishing. He also reports a case of a child of 9 months, who was brought to him with symptoms of stone, and through whose urethra a No. 6 English cannula was readily passed, and the bladder washed for diagnostic purposes, no stone being found. These statistics prove that litholapaxy is no doubt the operation to be advocated in children. Taken as a whole, the records are extremely creditable to their authors. J. William White, of Philadelphia,¹¹² records a case where impaction of a fragment of stone occurred in the prostatic sinus during a vesical spasm following the withdrawal of the lithotrite. This impaction offered such a thorough obstruction that it was found to be impossible to enter the bladder at the time with any instrument other than a very fine Nélaton catheter.



SIR HENRY THOMPSON'S MODIFICATION OF SMALL CALCULUS SOUND.
(*British Med. Journal.*)

The completion of the operation had consequently to be deferred. In a few days the obstructing fragment was passed *per urethram*, and the delayed operation was then resumed and completed. White has been unable, on searching the literature of the subject, to find the records of a similar accident.

Number of Sitzings in Lithotrity.—Guyon,²⁶⁶_{Dec., '90} in cases of phosphatic stone where extensive atony, together with much irritability of the bladder, exists, recommends a series of sittings rather than one very prolonged attempt. He gives, as his reasons for this conclusion, the fact that, no matter how thorough and prolonged the first operation may be, there is very frequently, indeed, something left in the vesical folds; that these cases are always much improved by a partial washing out of the fragments, and the bladder rendered more tolerant of subsequent instrumentation. Guyon shows, by experiments, that in these atonied bladders the evacuator exerts little or no attraction for fragments much over an inch from its eye. Hence the difficulty in removing everything at one time. It is poor policy for a surgeon to promise this class of patients any lasting relief from one crushing operation; for, even if nothing is left behind, it is easy for another calculus to form, and the surgeon who has promised too much is then apt to be blamed.

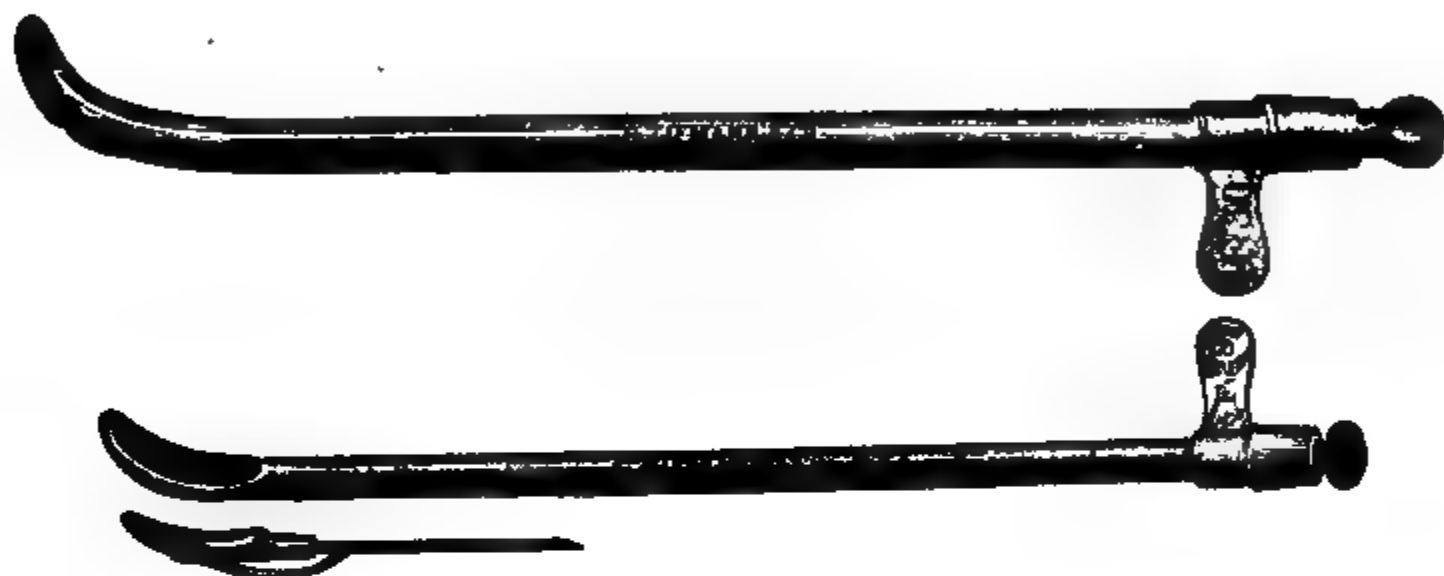
Guyon,⁸²⁷_{Feb., '11} calls attention to the great antiseptic value of solutions of nitrate of silver. He recommends that, in the operation of lithotrity, the bladder be washed out, before and after the operation, with a 1-to-500 solution. In all hæmorrhagic forms of vesical inflammation, excepting tuberculosis and neoplasms, he also advises vesical irrigations of solutions of this strength.

William K. Otis, of New York,²⁴⁵_{Jan.} in order to render the introduction of litholapaxy tubes less difficult, has devised a hard-rubber obturator, made to exactly fit the eye of the washing-tube, and held in its place by means of a steel spring. He has also modified the tubes somewhat.

Supra-Pubic Cystotomy.—Very little that is new has appeared this year on this operation. John A. Wyeth, of New York,¹⁰¹_{Aug.} records 23 cases occurring in his practice where this operation was required, all of which recovered.

L. Bolton Bangs,¹_{Mar., '14} introduces a hard-rubber plate, which he has devised to secure the catheter, in cases of permanent supra-pubic drainage, the plate itself being held in place by a tape passed around

the waist. There is also a piece of piano-felt between the hard rubber and the skin, which serves to keep the catheter from slipping and to absorb leakage. This last can be frequently changed. The junior editor has used this plate and likes it in cases where there is abdominal rotundity. In very spare patients, however, the tendency of the plate is to work up, displacing the tube.



MODIFICATION OF LITHOLAPAXY TUBES.
(*Journal of Cutaneous and Genito-Urinary Diseases.*)

Heydenreich, of Nancy,³ and Braun, of Halle,⁴¹ both report cases where, in order to remove vesical growths by the supra-pubic method, they found it necessary to temporarily resect the pubes.

PLATE TO SECURE CATHETER IN SUPRA-PUBIC DRAINAGE.
(*New York Medical Journal.*)

Peri-Vesical Tumors.—Guyon,¹⁴ contributes an instructive article on peri-vesical solid tumors, which, at times, account for obscure cases of chronic cystitis, and, at others, for vesical hæmorrhage, simulating intra-vesical tumors. By way of differential diagnosis, he lays stress on emptying the bladder with a catheter, and then, by hypogastric palpation, a peri-vesical, solid tumor is apt to be felt, while commonly an intra-vesical one cannot. Hydatid cysts come under this heading. They, strangely enough in

this region, almost always occupy the space between the bladder and rectum. As they grow, everything is pushed out of place. An unusually large number of these cases are reported this year by the following gentlemen: Hurry Fenwick,⁶_{Jan. 10} Tuffier,⁸_{Apr. 11} John R. Lunn,⁶_{Nov. 22, '90} and Blagowestschensky.⁸⁴⁴_{Jan. 10}

DISEASES OF THE PROSTATE.

The most important work this year on the prostate—in fact, I might say, on genito-urinary surgery—has been in establishing more firmly the operation of prostatectomy. Keyes,⁵⁹_{Oct. 11} after reviewing the literature of this operation, reports 11 cases,—3 perineal and 8 supra-pubic,—with 2 deaths. For thorough extirpation the supra-pubic route is advocated, the perineal being uncertain. The removal of the whole gland is not attempted or desired, the aim of the operation being to cut away the bar so that the *bas-fond* may drain, and so that there may no longer be a pent-up prostatic sinus. Failure to do this led Belfield to advocate a combined supra-pubic and perineal operation in some of these cases, which Keyes's method renders unnecessary. In soft hypertrophies the finger-nail and the curved scissors may suffice to remove the obstruction, but in the dense cases these do not avail at all, and the writer here accomplishes the thorough removal by means of the rongeur, thus solving this hitherto unsettled question. The results obtained in these cases are very gratifying.

Küster,⁸⁴_{Apr. 14} following the theoretical procedure advocated by Dittel, dissected out and removed, through the perineum (the endeavor being not to injure the bladder or rectum), portions of the prostate in 3 cases. This procedure is, however, faulty, as by it the lateral and not the median portion of the gland is removed.

R. F. Weir,¹_{May 20} reports 1 case of supra-pubic prostatectomy with restoration of the functions of the bladder. Weir recommends, in a case of projecting middle lobe, trying the amygdalotomy to effect its removal. Barth, of Marburg,⁸³⁶_{Nov. 22, '90} reports 3 cases of sarcoma of the prostate, and concludes that these cases are not as rare as one might suppose. They occur most frequently in childhood. Reverdin, of Geneva,¹⁹_{Jan., Mar.} records 2 cases of suppurative prostatitis where speedy relief and satisfactory drainage was obtained through the perineum by incision above, and then by dissection along the rectum till the abscess was reached, after the

method advocated by Dittel and Segond. J. Englisch, of Vienna,⁸⁴ has written an interesting article on prostatic atrophy.

URETERS.

Guyon is reported by his assistants, Albarran and Lluria,¹⁴ to have permanently catheterized the ureters during the space of nine days through a supra-pubic vesical opening, the bladder—which was tuberculous—being packed, in the meantime, with gauze, and kept dry. The catheters used are those designed by Pezzer, and made by Mathieu, of Paris. They are of very soft, pure rubber, with bulbous ends, and are introduced by means of a stylet. Poirier⁹²⁷ asserts that oil, injected into the ureter with a certain amount of force, passes into the renal vein without causing the rupture of any kidney-tissue, and reports experiments.

A. T. Cabot, of Boston,⁹⁹ reports a case of uretero-lithotomy, incision being made through the vagina on to the impacted stone. Recovery with fistula. F. S. Watson, of Boston,²⁴⁵ reports 2 cases of inflammatory stricture of the ureters.

M. P. Delbet,⁷ as a result of dissections, advocates, in order to expose the lower portion of the ureter, lateral decubitus on the sound side and an L-shaped incision on the affected side, the long arm of the L being almost vertical, and extending along the sacro-coccygeal border. The short arm is at right angles to the upper end of the long incision, and parallel to the fibres of the gluteus major. By extending the depth of this incision the pelvis is reached and the ureter easily exposed.

KIDNEY.

Nephrectomy.—F. S. Watson, of Boston,⁹⁹ concludes, from the study of operative statistics, that lumbar nephrectomy is the desirable mode of procedure in cases of pyo- and hydro-nephrosis and renal calculus, while the abdominal route is to be preferred in cases of cancer, sarcoma, and benign tumors.

In tubercular kidney Madelung, of Rostock,²²⁸ advises extirpation in cases where palliative measures fail of relief, where the second kidney is not diseased, and where there is no tubercular ulceration of the bladder. The writer refers to 3 cases of his own where the result was very satisfactory. The extra-peritoneal operation is the one advocated. Tuffier³⁶⁰ treats cases of large uniloc-

ular renal cysts by excising their walls and closing the renal wound by sutures. He claims good results from this method, with much less risk to life than attends total extirpation of the kidney.

Nephrorrhaphy.—Max Sulzer, of Bâle, ⁸⁰¹_{Jan. 1885}, after reviewing the literature of the subject, advocates in these operations the splitting and stripping off of the true fibrous renal capsule over a considerable area, and then suturing the capsular edges to those of the cutaneous wound, the kidney being secured in place by two deep sutures passing through its substance. Tuffier ⁸_{Apr. 1} also records his rather extensive experience with this operation.

Nephrolithotomy.—G. B. Turner ²_{Apr. 18} records an instructive case of double pyonephrosis with calculous suppression where nephrolithotomy of both sides was done at one sitting. Patient did well for seven days, when suddenly another attack of suppression ensued, and more stone was removed. After death, five days later, the autopsy showed extensive disease and more stone still remaining. R. C. Lucas ²_{June 17} reports well for the last six years the case which, in 1885, after undergoing nephrectomy, had, three months later, a calculous suppression lasting five days. The remaining kidney was then cut down upon and a small stone plugging its pelvis was removed, with the speedy recovery of the patient.

Nephrotomy.—Robert Abbe, of New York, ¹_{May 16} reports a case, one of a numerous class, in which, after cutting down upon and exploring a kidney from which persistent bleeding had taken place, although nothing pathological was discovered, a cure was effected.

MISCELLANY.

Koch's Tuberculin.—Guyon and Albarran, ²⁶⁶_{Feb.} Emil Burckhardt, of Basle, ²¹⁴_{Mar. 18} and J. E. Kelly, of New York, ¹_{May 16} have all made extensive experiments with Koch's tuberculin in genito-urinary disorders, without definite results in its favor.

Diuretin.—Keyes ⁹_{Oct. 31} records his experience with this drug, which he has given in his operative genito-urinary work to guard against chill and suppression, and with which he has been favorably impressed. The drug,—a whitish powder,—consisting of a combination of theobromine and salicylate of soda, is given in 10-grain (0.65 gramme) doses, every four to six hours during the period when trouble may occur. Keyes distinctly claims for this drug only experimental value, and will report its real value later.

SYPHILIS.

By J. WILLIAM WHITE, M.D.,

ASSISTED BY

EDWARD MARTIN, M.D.,

PHILADELPHIA.

Prehistoric Syphilis.—In a discussion on the existence of syphilis among the inhabitants of America before the discovery by Columbus, Hyde, of Chicago,⁵_{Aug.} after an elaborate historical review,—showing an epidemic in Spain just about the time of Columbus's sailing,—describes many instances of the discovery of bones bearing what has been supposed to be unmistakable evidence of syphilitic lesions. One element, however, he says, he has been wholly unable to establish beyond peradventure, viz., that the bones which he has examined, either directly or from photographs, were genuinely prehistoric; and, moreover, he does not think that any means exist of proving that the lesions found on the bones were produced by syphilis and nothing else. Hyde says that, until we are able to prove beyond a doubt that the burial-places of these bones have never been interfered with since pre-Columbian times, we cannot be absolutely sure that syphilis existed among the Indians of those early days. Contemporaneously with this article, Proksch,⁴⁵_{June 20; Aug.}⁵ writes on the probable existence of syphilis among the old Egyptians. In studying a papyrus containing instructions for the management of different manifestations of a certain disease known to the old Egyptians he traced out syphilis. The papyrus gave the treatment for the disease in the anus, in suppurating wounds, in the mouth, in the eyes, in the bones, in tumors of the head, in the body, in pustules, etc., giving an almost complete picture of the various situations in which syphilis may manifest itself.

Distribution.—Lesser,⁴⁵_{p. 37; July}¹⁵⁷ quotes Schierbeck to the effect that while syphilis is exceedingly rare in Iceland, yet no essential immunity exists, and freedom from it is the result of circumstances,

(F-1)

which he explains. He can find no satisfactory record of the disease in any of the chronicles of the island.

Syphilitic Re-infection.—In order to be able to affirm that we are in the presence of a case of syphilitic re-infection, Fournier²⁴⁵_{Des., 70} states that there must be: 1. An indurated chancre, with indolent inguinal pleiades; some weeks later, a typical roseola or other syphilitic eruption; cephalalgia, alopecia, mucous patches, etc. 2. A complete absence of tertiary accidents for some years. 3. A new indurated chancre after a suspicious coitus, with characteristic adenopathies, followed after some weeks by incontestable secondary accidents, such as headache, alopecia, mucous patches, typical eruptions of macular or papular syphilides, etc. According to the most recent researches (Fournier, Du Castel²⁰⁶³),²⁴⁵_{Des., 70} indurated pseudo-chancres may be divided into two classes: 1. Those which develop, as the result of the spontaneous awakening of the syphilitic virus, in a point where the virus has already manifested its action. In this case it is sometimes possible, where one has observed this lesion at its *début*, to distinguish it from syphilitic chancre; for, according to the investigations of Fournier, Vidal, and others, it begins by a hardness, profound from the first; then becomes excoriated and forms a sore; while the induration of the true chancre is consecutive to the ulceration, or, at the most, is contemporaneous with it. 2. Those which occur as the result of an extra-syphilitic irritation,—the inoculation of the chancroidal virus, for example,—of a simple herpes, or of any other traumatism. Here the sore has preceded the induration; the difficulty becomes greater when an inguinal adenitis develops, sometimes but slightly painful. Objectively, these lesions are absolutely identical with indurated chancre, their ulceration sometimes being more profound, more excavated, with more secretion; although this characteristic may fail. Petit²⁰⁵⁴ has collected a large number of cases of syphilitic re-infection, but doubt is cast upon the authenticity of the great majority of them. Certainly, when the disease occurs within four years of the first attack, it needs very positive proof to convince the majority of syphilographers that both attacks were truly syphilitic.

Hudelo²⁸⁷_{Nos. 5, 6} states that there is no authentic example of a case of re-infection in a syphilitic who is suffering from secondary manifestations of the disease, nor is there a case on record where re-inoculation practiced upon those presenting the

tertiary forms of the eruption has been successful; hence, immunity exists during the entire evolution of syphilis. As to the time when this immunity begins, it may be stated that it dates from the incubation of the chancre; but it is not always present, as is shown by successive chancres, each having distinct origins. It is, however, the rule that immunity is established from the appearance of the chancre, and, the author believes, is practically permanent. The vast number of cases of re-infection, if carefully analyzed, are found to be open to doubt. Hereditary syphilis also protects against re-infection.

Taylor²⁴⁵_{Dec., '90} reports a case of supposed second infection after the lapse of eleven years, but the history seems to be imperfect. He²⁴⁵_{Dec., '90} also reports a more interesting case of a young woman, the subject of hereditary syphilis, who had unmistakable lesions at the age of 19. These were cured. She married, and five years later contracted a chancre from her husband, and had a well-marked case of secondary syphilis. Taylor thinks the facts derived from present and future observations will very probably go to prove that, while the hereditary diathesis is yet active, an immunity, perhaps only partial, may exist, and that, as this grows progressively weaker and the inherited taint dies out, immunity grows less and less, and is finally lost, when acquired syphilis may be contracted.

THE CHANCRE.

Berkley,⁷⁶⁴_{May} having had his attention called by Councilman to the degenerated nerve-fibres in a section of a hard chancre, undertook some investigations upon syphilitic growths of various stages, comparing them with inflamed tissues. He found the degeneration constant in the specific lesions, and believes that in the chancre it is caused as follows: There is first disturbance of the arterial circulation, superinduced by the intense endarteritis and consequent changes in the lymph-flow; then follows swelling, more or less pronounced, of the connective-tissue elements, especially of the intertubular, and subsequent nutritive changes in the axis-cylinder and myelin,—the first disappearing in the part involved, the latter becoming glassy, rarely granular; finally, as the lack of nutriment continues, the tubes atrophy, more or less completely, and are replaced by the swollen connective tissue, which always seems to require less nourishment than more highly organ-

ized structures. The rapid growth of the small-cell formation is undoubtedly an important factor in the case, assisting and intensifying the atrophic process by direct pressure from all sides on the nerve. This is shown by the fact that the nerve-bundles are very seldom degenerated, unless they are surrounded on all sides by the newly formed cells. That the process is more atrophic than inflammatory is shown by the lack of profuse increase in the intertubular connective-tissue nuclei, they very rarely becoming numerous, though their number is always somewhat above the normal.

For an answer to the question as to why the nerves should degenerate in syphilitic and not in simple inflammations, the following replies may be made: (1) the infiltration of cells of an embryonic type is generally denser, and the proliferation of the connective-tissue elements more of a sclerotic type than in simple ulcerations, therefore more liable to influence nutrition by compression; (2) the endarteritis is more pronounced; (3) the syphilitic virus permeating the tissues may in itself cause a predisposition to nerve degeneration by its general action in lowering nutrition, but the stoppage of the arterial supply and the dense cell proliferation within the meshes of a hypertrophic connective framework, which permits of little expansion, and causes the woody feeling distinctive of the true chancre, are most probably the potent agents in producing this mixed form of interstitial parenchymatous neuritis.

Palmer,²² sums up some of the accepted facts of syphilography as follows: "That there is a bacillus, whether it be that of Lustgarten or not; that is, that this disease is, *ab initio* and always, a specific disease, is not denied by any one; that induration is the rule, but not invariable; that a history of incubation, when obtainable, is our best diagnostic means; that the percentage of doubtful sores, even with the most skilled, is large, and that pus from an inflamed chancre may produce chancroid, but not necessarily syphilis, are certain." He protests against the old and almost universal custom of beginning treatment while still in doubt; recommends the antiseptic treatment of chancroid, or, in worse cases, curetting or excision; and advises enucleation of the chancre when it is locally possible, without too much scarring, but does not expect to prevent constitutional

infection thereby. He thinks chancroid is the result of infection with the pyogenic organisms and not with a specific microbe.

Genital Chancres in Women.—Taylor²⁴⁵_{Nov.} says that extra-genital chancres occur more frequently in women than they do in men. In women they are less regular in their course, and are often so small, benign, and ephemeral that they may never be seen or their nature not suspected. For clinical purposes, genital chancres in women are classed as follows: (1) the superficial or chancrous erosion; (2) the scaling papule or tubercle; (3) the elevated papule or tubercle,—*ulcus elevatum*; (4) the incruusted chancre; (5) the indurated nodule; (6) the diffuse exulcerated chancre. As a rule, chancres of the female genitals are unaccompanied by pain.

Primary Incubation.—Nivet and Puech²⁴⁵_{May} report cases of long primary and secondary incubation. In 1 case the former was 81 days, another 97. In a third case the secondary incubation was 3 months. Puech⁴⁷⁹_{July 21} recalls the case of Jules Guérin, in which the chancre appeared 71 days after coition; that of A. Martin, of a young woman 18 years old, entered, July 15th, at the St. Lazare Infirmary, in whom a chancre appeared September 29th,—that is, after 76 days of absolute seclusion; and those of Mauriac, in which the dates of the appearance of the chancre were 63, 69, and 71 days after the last sexual exposure. Fournier, in an article on the long incubation of the infecting chancre, cites as the maximum a case in which the duration of the incubation was 76 days. Nevertheless, Simonet and Lefort have acquainted us with a case in which the duration was 3 months.

Extra-Genital Chancres—Peculiar Mode of Infection of Mother from Child.—Tuholske¹¹_{Nov.} reports the case of a young woman 20 years of age, whose character could not be suspected, and who had been married two years. She presented herself, with ulcers of the rectum and condylomata. No initial lesion could be discovered about the mouth, throat, or vagina. The post-cervical glands were enlarged and a slight eruption was present. Upon examination, her husband showed no signs of syphilis. Upon request, she also presented her baby for an examination; this showed that the baby had had a sore on its lip and was suffering from syphilis. A sore was then discovered upon the nipple of the mother. Inquiry elicited the fact that a young man

who had syphilis had been in the habit of kissing the baby, thus infecting it,—the baby in turn infecting its mother. In 46 cases of extra-genital infection, Rona²³⁹ observed 26 cases of chancres of the lips, nearly all produced by kisses of syphilitic persons. The same cause produced 8 chancres of the tonsils.

Chancres of the Fingers.—Taylor²⁴⁵ proposes the following classification for the various forms of chancre of the fingers: (1) the scaling papule or tubercle; (2) the excoriated or ulcerated nodule or mass; (3) the fungating chancre; and (4) the psoriasis-like chancre.

LOCAL MANIFESTATIONS OF CONSTITUTIONAL SYPHILIS.

Pigmentary Syphilides.—After a study, extending over several years, Fireisky²⁴⁵ concludes: 1. That syphilitic pigmentations show themselves in the secondary period, and occupy, in preference, the neck, and occasionally other regions. 2. Leucoderma, in its typical form, is always specific. 3. At times the latter co-exists with gummata. 4. Pigmentations may remain for several years, and can be regarded as among the best signs of the secondary period. 5. They are more frequent in women; but the generalized forms are more frequent in men. 6. They appear in the third month in 40 per cent., in the fourth in 20 per cent., in the fifth in 20 per cent., and in second half of the first year in 20 per cent. of the cases. 7. They persist, usually, from one to seven years. 8. Mercury and iodide do not influence them to any great degree; but they are not well marked, excepting in the cases where mercury has not been employed at all, or only in an inefficient manner. 9. The later they appear, the less prominent they are. 10. Three forms can be described: the marbled pigmentation, the spotted, and the retiform.

So-called Circumscribed Atrophy of the Skin after Secondary Syphilis.—Oppenheimer⁴⁵ describes a case in which there occurred, after a maculo-papular, and, in part, a crusto-ulcerating secondary syphilide, pigmentation spots on the extremities and trunk, which were, for the most part, pea-sized, but upon the abdomen were confluent, and formed map-like areas of discoloration. The color was brownish-red upon the lower extremities, but upon the abdomen, in the axillary regions, and the upper arms, the spots were blue; so that not only from their color, but from the localization

as well, one was forced to think of *taches bleues*, from the presence of pediculi. Careful inspection, however, showed that, while some spots were slightly raised above the surface and others were on a level with the skin, there were, upon the arms, spots which were about a millimetre below the skin-level, so that they appeared like retracted scars. This, and the absence of pediculi, excluded the latter as a causative agent. Microscopic examination showed all the vessels, and in some sections the whole papilla, markedly infiltrated with round cells, and the lumen of the vessels was no longer visible. The epidermis was somewhat thinned, and the papillæ, in many places, were flattened and fused together. Relatively little has been published upon partial atrophy of the skin in secondary syphilis. Balzer, Nivet, and others are quoted, and the writer agrees with Balzer in regarding the atrophic spots as similar in appearance to the atrophic lines of pregnancy. But neither Balzer nor Nivet made microscopical examinations, and the view is expressed that future observations will not show atrophy of the skin any more than was shown in the author's case. The process is regarded, on the contrary, as a thinning of the connective tissue from stretching, and it is believed that it will disappear in the course of time, leaving the skin with its normal appearance. The author's case was seen again after two months, when some of the depressions had grown less noticeable, and the blue color had in a measure disappeared.

Syphilitic Pleurisy.—Nikulin⁴_{No. 40} recognizes three forms of pleurisy dependent upon syphilitic infection: The first is due to extension of specific inflammation from the lungs to the pleura; the second depends upon extension from the chest-walls to the pleura; the third is the true specific pleurisy, and affects, primarily, this membrane. A case is reported. Chantemesse¹⁴_{Aug. 19} reports 3 cases developing at the period when syphilitic roseola appeared, and apparently dependent directly upon the specific disease. No other cause beyond syphilis could be found. The disease began with a slight, localized pain, which gradually increased in intensity; it was attended by fever, with exacerbations. The course of the disease was rapid. In some reported cases there has been an abundant effusion. The rapidity of the evolution of the disease and the variability in its course were the particular features which associated it with the lesions of secondary syphilis. In the absence

of autopsies such cases cannot be regarded as truly specific. The asserted reasons for so classing them are insufficient.

Mucous Patches of the Conjunctiva.—Laumet,⁷ reports a case in which, twenty days after the appearance of syphilitic roseola, mucous patches appeared upon the conjunctiva. These developed while the patient was salivated. They yielded to instillations of sublimate solution (1 to 2000) and the administration of iodide of potassium.

Syphilis of the Alimentary Tract.—Sauvineau,⁶⁴ reports a case of cicatricial narrowing of the isthmus of the fauces of syphilitic origin. An operation was performed by Péan, and the tongue and pillars of the fauces were separated from each other, and held apart by wire sutures until healing was complete.

In one extreme case of the kind I was compelled to perform laryngotomy under circumstances of extreme urgency, a concomitant pharyngitis having so filled the narrow chink that was left with tough glairy mucus that the patient had stopped breathing for a minute or more before I reached him. He was resuscitated, and lived for some time.

Rieder,⁵⁷ as the result of a critical study of 11 cases of specific involvement of the bowel in acquired syphilis, announces the following conclusions: The seat of ulceration is usually in the small bowel, and especially in its upper portion; the ulcers are usually placed in pairs or groups,—sometimes are present in large numbers. These ulcers were found to extend completely around the lumen of the gut. They attained some depth, whilst the walls of the bowel became thickened, especially the muscular coat. As a result of these ulcerations narrowing may occur, with consecutive dilatation and decided atrophy of the walls of the gut. The ulcers are similar in character to other ulcers of the gut. In their histological structure they are characterized, first, by an infiltration of the tissue, particularly in the upper layer of the mucous membrane; this is especially marked about the blood-vessels. The infiltration finally involves all the coats of the bowel, and is followed by secondary ulceration. This condition offers no clinical features peculiar to itself. Post,⁹⁹ reports 2 cases which, he thinks, illustrate the fact that syphilis invades the intestinal tract in some manner, with more or less frequency. Some intestinal symptoms are doubtless the result of a nervous influence of syphilitic origin. Some are possibly caused

by disease of the mucous coats, similar in character to that which causes the cutaneous symptoms, or the lesions of the mucous membranes. It is also fairly well established that very serious lesions of the gastro-intestinal tract may take place. The two extremities of the digestive canal, which come within our observation, are subject to syphilitic disease, ulceration, cicatrization, and the formation of fibrous tissue which results in strictures. Though attempts have been made to explain the existence of stricture of the rectum as simply an extension of the external ulcerations of primary syphilis or pseudo-syphilis, it is to-day fully established that this is one of the results of the constitutional infection. Stricture of the œsophagus is equally well recognized as an occasional result of syphilis.

Syphilis of the Kidneys.—Petersen,² while conducting an inquiry into visceral syphilis, was struck with the fact that 788 necropsies of syphilitics showed 34 with renal lesions; and of 36 fatal cases, 7 had succumbed to chronic nephritis. He accordingly extended his investigation, and reached these conclusions: 1. In all syphilitic cases admitted to the hospital the urine should be examined immediately after admission. 2. A genuine albuminuria should be strictly differentiated from a transitory or a spurious variety. 3. Syphilitic albuminuria occurs in about 3.8 per cent. of patients with recent syphilis, 3.8 of those with secondary symptoms, and 5.8 of those with late manifestations. 4. In syphilitic patients with nephritis a mercurial treatment readily gives rise to lesions of the gums; hence, whenever gingivitis appears in a syphilitic patient the urine should be examined immediately. 5. The salicylate treatment may sometimes produce transitory albuminuria; such cases, however, are very rare, and the symptoms soon disappear. 6. The elimination of mercury by the kidneys never causes a genuine albuminuria, and generally does not cause renal irritation. 7. On the contrary, syphilitic albuminuria is rapidly cured by the use of mercurials.

Syphilitic Arthritis.—Rasch^{55 Feb. 28} states that syphilitic joint affections are exceedingly rare. The particular form of syphilitic disease known under the name of specific chondritis or chronic hypertrophic syphilitic arthritis, is characterized partly by a circumscribed ulceration and a fibrillar breaking up of the cartilage, with the formation of villous outgrowths, partly by the presence

of radiating, depressed cicatrices placed in the cartilage, and partly by a diffuse thickening of the synovial membrane and a marked proliferation. The lesions seem always to invade both the synovial membrane and the cartilage. The ulceration of the cartilage depends upon gummatous infiltration. The clinical features of a case of syphilitic chondro-arthritis are said to be: Diffuse soft swelling of the synovia, with slight limitation of movement; pain, which is present to a limited degree, and is not aggravated by motion. They are evidently not distinctive.

Duguet,^{8 Feb. 14} presented a case of periostitis of the temporal bone, accompanied by myositis of the temporal and masseter muscles, apparently of syphilitic origin. Fournier, commenting on this case, states that he has observed only 4 or 5 similar ones. Feulard,^{3 Feb. 14} presented a case who suffered for two years from an enormous gummatous tumor of the left thigh. This enlargement was mistaken for one of malignant nature, and an amputation was proposed. It was later suspected that it might be syphilitic. Constitutional treatment was instituted, and was followed by speedy cure.

Enlargement of Subcutaneous Lymphatic Glands in Tertiary Syphilis.—Montgomery,^{77 Feb.} reports a case of overgrown cervical lymph-glands, reaching an unusual size, and yielding to full doses of iodide of potassium. He adds: "Jonathan Hutchinson, in discussing a similar case reported by McCall Anderson,²⁰⁷¹ objects to considering the enlarged glands syphilitic simply because the tumors disappeared on the exhibition of large doses of iodide of potash, for the reason, as he truly remarks, that this drug first won its place in our estimation by its success in reducing glandular enlargements, and was not used for syphilis till long after. According to Es-march, a large number of tumors which are diagnosed and extirpated as sarcomata are really syphilomata, and can be cured by a well-directed treatment, without which they run a markedly malignant course, returning *in loco*, and appearing to give rise to metastases. He even says all sarcomata may be the expression of syphilitic taint, one of the principal effects of luetic virus being connective-tissue overgrowth."

Nerve Syphilis.—Hutchinson^{808 Apr.} reports 3 cases of paralysis of the deltoid from syphilitic neuritis of the circumflex nerve. In one of them there was paralysis of one lateral half of the deltoid, while the other was unaffected.

From an anatomico-pathological point of view, Gilbert and Leon²⁴⁵_{Dec., '90} have distinguished four types of medullary precocious syphilis: (1) *hyperæmic and necrobiotic meningo-myelitis*, characterized by congestion and, perhaps, by multiplication of the vessels of the cord and its membrane; (2) *embryonic meningo-myelitis*, characterized by cellular hyperplasia, diapedesis, and vascular exudations; (3) *diffuse meningo-myelitis*, characterized by a fibrous formation, especially around the vessels, by induration of the cord and thickening of its meninges, so that the new tissue is substituted for the normal meningo-medullary elements; (4) *gummatous meningo-myelitis*, characterized by the accumulation, at certain points, of round cells in the form of small tumors, which then undergo the degenerations peculiar to nodular syphilitic products.

Syphilis of the Tongue.—Du Castel¹⁷_{Sept., '26} states that chancre of the tongue is rare, but when present is found, in the great majority of cases, upon the point of this organ. It assumes no special form. The induration is usually well marked. Should it become inflamed through any irritant there may be much pain. Usually the process is an indolent one. Adenopathy is marked in the sublingual lymphatic glands. Secondary manifestations upon the tongue are exceedingly common. Roseola manifests itself in the form of light stains, which desquamate slightly. Sometimes there is a papular eruption. These manifestations may be isolated or confluent. Mucous patches are much more frequent, appearing upon the borders of the tongue, and often exhibiting vertical fissures, in which case they are painful. If multiple, they are accompanied by a general swelling, the imprint of the teeth being clearly seen upon the borders of the organ. Upon the upper surface of the tongue secondary lesions are polymorphous. Erosions and fissures are common, and, although small, occasion much pain. They are usually located upon the sides of the organ. Ulcers are usually of small extent, sometimes diphtheroid in appearance, occasioning pain and interference with mastication. Papules are rounded or oval, their axes running antero-posteriorly. These lesions are very common, and are rebellious to treatment, since, after a time, they occasion interstitial hyperplasia, the papules becoming confluent, forming plaques. When ulceration occurs, the loss of substance is usually superficial; when it extends and becomes deep, there is,

usually, but slight concomitant inflammation. Secondary syphilis is also characterized by localized desquamation, forming the smooth plaques of Fournier, a condition quite similar to alopecia. This lesion is also observed in tertiary syphilis, and may lead to a psoriasis of the tongue. The circinate disposition of the lesions is remarkable. The secondary manifestations upon the tongue are contagious, have a tendency to recur, are often circinate, and, unless they become inflamed, are remarkably indolent. Application of nitrate of silver or acid nitrate of mercury does not cause them to turn white.

The tertiary lesions are either sclerous or gummatous in type. The use of tobacco is a strong predisposing factor to their development. The ulcerations of glossitis are superficial or cortical, parenchymatous or deep. Ulcerating, superficial glossitis is characterized by patches of superficial induration, of a rounded or oval form, but sometimes irregular. On palpation a distinct hardening is felt. These lesions are ordinarily chronic in course. The deep, ulcerating glossitis generally occupies a considerable portion of the tongue, and is preceded by marked tumefaction of the organ. The lesion is usually unilateral, and atrophy ultimately results. Lobulation is observed on the anterior face of the tongue, together with deep cracks, erosions, and ulcers, usually mechanical, resulting from the action of the teeth. Diffuse sclerous glossitis is rare; when it is developed the tongue is found to be enormously swollen and extraordinarily hard. The surface is smooth and devoid of papillæ, and shows red and white patches on its surface. Gumma of the tongue may be mucous, submucous, or muscular. The mucous gummata are observed as small nodosities, round and hard, varying in size from a small shot to a cherry, and projecting slightly, sometimes being only perceived on palpation. They soften, break down, and ulcerate. The deep or muscular gummata are almost exclusively found upon the superior surface of the organ, varying from the size of a bean to that of a lemon, and are ovoid in form. There may be one or many gummata. At first they form solid masses, firmly adherent to the surrounding tissues. In one or two months the tumor approaches the surface, softens in the centre, and discharges. The confluent and phagedenic gummata are grave. All tertiary manifestations of syphilis develop insidiously, and are accompanied by slight clinical phenomena,

these latter being usually dependent upon the deformity and stiffness of the tongue. Pain is only produced when the organ is moved, and is not proportionate to the extent of the ulcer.

Syphilis of the Breast.—Syphilitic disease which involves the breast has recently attracted some attention. Its usual time of appearance is quite late, but, like the other late forms of disease, it may occur early, as in a case of Ambrosoli,⁶¹⁶ in which one breast was hard and smaller than the other, very soon after the first appearance of secondary symptoms. Swelling of the second breast followed, and both returned to normal size under the use of iodides. Apparently, syphilitic disease may either manifest itself as a diffuse enlargement of the gland or as a separate gumma; in the latter case it conducts itself as do gummata in other situations. The disease occurs in men as well as in women, and in hereditary as well as in congenital cases.

Vaccination Syphilis.—Hutchinson⁸⁰⁶ reports another case of simulated vaccination syphilis. The infant was perfectly healthy up to the time of vaccination, and the lymph was not taken from a human subject. The skin around the vaccination sore passed into gangrene, and there was, at the same time, a large, swollen gland in the armpit. In addition, suspicious tumefaction occurred in the skull-bones. In this case, as in the former one, much benefit seemed to be derived from the use of mercury. Periosteal swelling rapidly subsided. In neither of the cases reported was there the slightest evidence that either parent had suffered from syphilis, and in neither had the infant, prior to vaccination, shown any symptoms. In 1 case the child was the first-born, in the other there was a healthy elder child. From these cases the supposition seems rational that it is possible, after vaccination, independent of any syphilis, whether implanted or hereditary, to evoke symptoms which have hitherto been regarded as peculiar to the latter malady, and which are apparently greatly benefited by specific treatment.

Two other cases were observed, which presented an almost identical chain of phenomena, with, however, the difference that they were both vaccinated from human lymph. It seems quite certain that if these cases have anything whatever to do with syphilis it is due to the inherited taint, and not to the introduction of the virus by vaccination.

Prognosis of Syphilis.—Abner Post⁸⁹_{Oct. 15} contrasts the opinion of Hutchinson,¹⁵_{Jan.} who says that syphilitics appear quite as likely to live as long as others, and that treatment often improves the health, with that of Gowers,⁶_{Feb. 16, 79} who believes syphilis to be an incurable disease. These opinions are, however, not so contradictory as they might seem, since incurable diseases are not necessarily fatal, or even dangerous to life.

My own observation and experience would lead me to agree with Hutchinson, and I think it strange that life-insurance companies have so long retained in their list of questions the very objectionable one as to whether or not the applicant has ever had syphilis. It costs them many thousands of dollars annually, and I do not believe that they get any equivalent in the average increased expectation of life of the insurers. The contrast, however, between acquired and hereditary syphilis is, in this respect, very striking. Fournier's estimate of 80 per cent. of deaths of the product of conception in paternal syphilis, and a larger proportion when the disease is derived from the mother, and Tarnowsky's figures to the same effect (see section on "Hereditary Syphilis"), indicate the difference.

Post⁸⁹_{Oct. 15} calls attention to the following interesting facts: By far the largest number of cases of late syphilis occur in the third year after inoculation; from the third year on, the number diminishes, and after the tenth year it may be considered rare. Most of the cases with late symptoms, of which he has known the earlier history, have been late in coming under treatment, or there has been some fault in the therapeutic measures. No method exists that will allow us to promise a cure; that is, an absolute immunity from the danger of subsequent attacks. The contagiousness of late symptoms must be slight, if it exists at all. The inoculability does extend to two and a half years, and may (exceptionally) still exist at the great length of six years. The power of transmitting the disease to offspring remains long after the power of direct inoculation seems lost. Nocturnal osteocopic pain is of diagnostic value, but ought not to be considered alone as absolutely reliable, especially if it is referred to spots which are only exceptionally attacked by syphilis; in other words, it is not impossible that pain from other causes may be nocturnal in character. As a working diagnosis, the conclusion of syphilis from nocturnal pain alone may be proper,

but as a positive diagnosis, which shall follow the patient through life, it is insufficient.

HEREDITARY SYPHILIS.

Jullien^{118 51}_{July, Nov.} has gathered the histories of 206 cases of pregnancy in which there was a syphilitic history. Of this number, 113 resulted fatally for the children, 36 being terminated by abortion, 8 by still-birth, 69 by death at a very early age. Of the 93 living children, 50 were syphilitic and only 43 in good health. The deaths in early life were from the following causes: Meningitis, 21; convulsions, 8; diseases of the throat, 12; diarrhoea and athrepsia, 5; other diseases, 23. Meningitis is the most frequent cause of death, though the diagnosis in all the cases recorded was not clear. Exceptions to the ordinary rules of heredity may be divided into several classes: In the first, syphilis in the child has only late manifestations; in the second, there are phenomena which may not be regarded as relevant to syphilis, but which are often observed in the children of syphilitics, such as tubercular meningitis, diphtheria, etc.; in the third class are the exceptional cases referred to by Diday, as a syphilitic child being born of a mother who has previously had several children free from syphilis.

Raymond²⁰⁷⁸ reports the following history: A man married four years after contracting syphilis and more than a year after his last symptoms. His wife gave birth, in one year, to a healthy child; at the end of two years, to a syphilitic child; two years later, to a feeble 8 months' child. Ten years later she had a tubercular syphilide. The case is interesting, as it reverses the ordinary history, which is that, with syphilitics, the first pregnancies end in abortions, the next in the birth of syphilitic children, and that later ones are followed by the birth of healthy infants. Its probable explanation is that, at the time of the first conception, the father was still under the influence of specific treatment, but that, considering the birth of a healthy child evidence that he was completely cured, he stopped treatment, and then procreated a syphilitic child, and thus infected the mother. Such cases are rare, but possible.

Strain²¹³_{Feb.} considers the subject of syphilis and marriage, and concludes that the effect on procreation varies according to the mode of infection of the parent, whether the disease is acquired

or hereditary, the time of infection, and the parent who is the subject of the disease. Where both the man and the woman and also where only the woman have suffered from primary chancre, the results, as far as procreation is concerned, are very disastrous. Frequently the disease seems to entirely destroy the conceptive power, or, if conception does take place, abortion, or, at best, a child which suffers severely from syphilis, is the result. Where the man only has chancre, and also where there is a suspicion of hereditary syphilis in one or both parents, the power of conception is little affected, but the result on the product of conception is still very serious. Abortions and miscarriages are appallingly frequent, as well as children born dead, or who die within a short period of birth. A very considerable proportion of children are born at or near full term, alive, develop syphilitic manifestations, from which they may recover and grow up to be men and women. In not a few cases, especially where the syphilitic infection of the father took place four or more years before marriage, and where the mother entirely escaped the disease, or had only the minimum of its manifestations, children may be born who never at any time show evidences of syphilis. The same cannot be said of the woman. If she has been infected either through chancre or through the foetus, the effect seems to be of a more permanent or lasting kind. The author strongly inclines to believe that the remarkable tendency to destroy or weaken the reproductive power manifested by the syphilitic poison extends to the next generation; in other words, that, in persons who have inherited syphilis, but have survived and married, the reproductive power is abnormally diminished, as shown by barrenness, frequent abortions, or the presence in the children of such skin diseases as psoriasis.

Diday²¹¹ quotes, with approval, these two conclusions of Fournier²⁰⁷⁴: "The child dies from paternal syphilis oftener than it simply inherits it and is born living. In 103 cases there were 84 abortions, premature births, or early deaths. Maternal syphilis is still more dangerous, as, on the one hand, it is the most certain method of transmission, and, on the other, it is fatal in twice as large a proportion of cases."

Hutchinson⁸⁰⁸ reports 3 cases occurring in one family, which seem to him to establish the following facts: That a mother the subject of syphilis by conception, and having had no treatment,

may transmit syphilis to an infant born seven years after the one which infected her; that a succession of children really the subjects of taint, as definitely proved in two of them, may pass through infancy without the slightest manifestation of it; that the physiognomy of inherited syphilis and the notched teeth may be wholly absent; that considerable value for purposes of diagnosis attaches to the prominence of the frontal eminences; that the conditions of phagedenic destruction of the soft palate in young people and of symmetrical deafness are both of them really consequences of inherited taint, and may be trusted as in themselves constituting proof of it.

Diday and Bouchard²¹¹_{Aug. 9} have condensed an interesting correspondence relative to the mode of causation of the immunity of the mother in syphilis,—“*heredo-paternelle*.” Diday concludes that the general law applicable to the case may be expressed as follows: All infectious diseases may certainly be mitigated to the point of absolute protection by the methodically repeated inoculation of their essential cause (microbic) or of its products (toxic ptomaines, etc.). Bouchard says that, while the foetus retains the supposed pathogenic agent itself, the products dissolved in the blood find their way to the tissues of the mother, and set up a nutritive change, resulting in what he calls a “bactericidal condition,” which renders difficult or impossible the development of the infectious agent when introduced by later inoculation, as from the lips of her child.

This explanation of the law of Colles has been given before (see ANNUAL for 1890, vol. i, M-33), and is, in the main, accepted as probably true by most authorities who have recently written upon the subject.

Tarnowsky⁸⁶³_{Oct. 90} gives, according to his experience, very gloomy evidence as to the results of syphilis on succeeding generations. He believes that 71 per cent. of women suffering from syphilis either give birth to dead children or bear children who die within a year. He records the history of three families where the fathers had contracted syphilis six, five, and four years, respectively, before marriage. All these men appeared to be cured when they married, and all their children were born healthy; yet, of these 22 children, only 1 grew up to be a healthy man, 5 were premature, 3 died of meningitis before

attaining their second year, 2 were imbecile, 1 an idiot, 1 a cretin, 1 had numerous signs of degeneration, 1 was weak in intellect, 1 had sexual perversion, 2 hysteria, 1 epilepsy, 1 was born dead, 2 had hydrocephalus. Of the 13 still alive when these statistics were taken, 8 were incapable of working for their living, 5 being sickly and nervous. All three families were of the respectable commercial class; none of the children were exposed to the hardships which, in the case of peasants and artisans, may cause infantile diseases falsely attributed to syphilis.

Hutchinson⁸⁰⁶ calls attention to the differences between syphilitic teeth and those damaged by mercury in infancy. He gives the records of 2 patients,—one the subject of zonular cataract and the other of interstitial keratitis. In the former there was the history, as usual, of very severe and long-continued convulsions in infancy, and of the liberal use of mercurial powders for their control. All the incisor teeth were defective in enamel, and were thin, serrated, and discolored. The eight premolars were all good, and well covered with white enamel; but the four test teeth—the first molars—were, in every instance, wholly denuded of enamel, and presented a rough, spinous surface, much discolored. In the patient who suffered from interstitial keratitis and was the subject of inherited syphilis, all the teeth were perfect and were covered with white enamel, with the exception of the upper central incisors, each of which presented a single crescentic notch. In this instance the young lady presented no indications of inherited syphilis, excepting her teeth and her keratitis. She had not been ill during infancy in any way, and had consequently escaped mercurial treatment. In a large majority of instances in which we meet with syphilitic teeth, the patients have taken mercury in infancy, and the enamel-defects consequent upon its use are present, together with the notch indicating hereditary taint. This frequent, indeed ordinary, coincidence of the two sets of conditions in the same case has led to much confusion and some difficulty of diagnosis on the part of those who have not learned to discriminate.

Spéville¹¹⁸ reports a case of hereditary syphilis, with serious ocular manifestations, occurring in a child aged 5 months. The symptoms yielded not at all to a two-month course of Van Swieten's solution and inunctions, but disappeared rapidly under

injections of bichloride of mercury. Before hypodermatic medication the child had become completely blind. Within a month after the institution of the hypodermatic treatment the retinitis had partly subsided and the skin manifestations had mainly disappeared. In two months ophthalmoscopic examination showed the eye-ground to be almost normal, and the child seemed completely cured. In the treatment of this case, two series of eight injections each were adopted, with a rest between of fifteen days.

Craniotabes and Parrot's Nodes.—Carpenter²_{Apr. 25} considers that both craniotabes and Parrot's nodes are usually syphilitic manifestations, although they are frequently regarded as manifestations of rickets; 74 per cent. of cases of craniotabes are syphilitic.

TREATMENT OF SYPHILIS.

Excision—Abortive Treatment.—Fournier¹⁰⁰_{Sept. 24} states that the curative or palliative effect of excising a chancre is doubtful. Excising sores when there is already adenopathy is now absolutely proven to be useless. In chancres just developed, it is right to take whatever slight chance seems to be promised by excision. A report of a case of excision, followed by arrest of syphilis, to be accepted, should fulfill the following four conditions: 1. Examination of the person from whom the patient acquired the disease, in order to be absolutely certain that the patient has been exposed to syphilis. This proof is wanting, in the great majority of cases. 2. The classical duration of incubation. 3. A complete report describing the symptoms, and eliminating, on rational grounds, soft chancre, herpes, ulcerative folliculitis, and the chancre-like syphilides. 4. Prolonged observation of the patient, without administering either mercurials or iodides.

Augagneur³_{Apr. 4} quotes the case of a patient whose prepuce was removed on the appearance of a chancre, and in whom, nevertheless, characteristic secondaries appeared. In this case gonorrhœa was contracted. On account of phimosis, circumcision was performed. Two months after the coitus—from which the patient contracted his gonorrhœa—a roseola appeared upon the body, accompanied by characteristic enlargement of the glands of the groin. No trace of the chancre could be found. This case tends to cast doubt upon the preventive treatment by excision, even when such treatment is adopted at the very earliest period.

Taylor⁸⁰ says he has now learned why efforts at radical treatment of the initial lesion have hitherto failed. As the basis of a series of carefully instituted observations, in which the microscopical work was undertaken by Van Giesen, he used, as specimens, portions of tissue taken from the neighborhood of various initial lesions of verified specific character and of only a few days' development. The results of the investigations have gone to show conclusively—as he thought was demonstrated by the enlarged microscopic drawings which he exhibited—that, though the tissue around the chancre appeared perfectly normal, there was already widely disseminated involvement of the subcutaneous structure. This consisted in changes in the circumvascular spaces by infiltration with small round-cells, all the smaller arteries and veins over a considerable area beyond the initial lesion being thus involved. There was also in progress a process of abnormal proliferation of the endothelial cells of the vessels.

From this he believed it could be deduced, beyond dispute, that the infective processes were from the period of implantation of the virus, of so rapid a character as to render utterly futile any attempts at aborting the disease by cautery or excision of the initial lesion, however early it might be observed.

Jullien¹⁷ has excised, in the last ten years, 18 chancres, and, as a result, is a strong believer in this method, although he freely concedes that the results cannot be certainly predicted in individual cases. The operation should be carried out with minute attention to all surgical details. The entire induration must be removed. This produces a loss of substance rarely smaller in area than the surface of a quarter of a dollar. After excision the chancre should be examined, to discover whether the cut has been carried through healthy tissue. The wound should be closed by suture. Anæsthesia is accomplished by means of cocaine. In most cases union took place by first intention. In 4 cases an indurated plaque appeared beneath the suture, but was not followed by ulceration. In 3 cases a gray pseudo-membrane formed. In 2 cases successive chancres appeared, due to inoculation of virus, in points more or less remote from the first sore. In 1 instance there were three eruptions of successive chancres, requiring three excisions. Of 15 cases that remained under observation, the disease was completely aborted

in 3. The first was operated on in 1880. The chancre was nineteen days old at the time of operation. Mercury was administered internally for a time. The patient married, and had two healthy children. The second case gave a history of incubation of twenty-eight days. The sore was twenty days old. There was enlargement of the lymphatics of the groin. Operation was undertaken for the relief of the indurated phimosis, rather than for the purpose of aborting syphilis. The patient never exhibited the characteristic lesions of syphilis, married, and became the father of healthy children. The third case did not heal by primary intention. A nodule of induration appeared in the cicatrix, which finally formed, three months later, a chancroidal ulceration near the frænum. This patient was under observation eight months, but showed no signs of syphilis. The fourth case, after excision, exhibited secondaries in their very mildest type. Seventeen months later he suffered from re-infection. The 11 remaining cases all presented general symptoms, and the author is not able to state whether or not they were benefited by operation. Excision should not be performed when it would necessitate an amount of deformity which would in any manner interfere with normal function.

An editorial writer,¹ believes that "Jullien has inextricably confounded chancres and chancroids in this article. The excision of a local ulcer may, very possibly, be of benefit, but the excision of the local manifestation of a constitutional disease can exert no effect on the future course of the disease. To quote a classical writer: 'The chancre may be destroyed by caustic or the knife, but the disease (syphilis) will run its course unaltered.'" The quotation and editorial note are instructive. It seems probable that Jullien knows a chancre from a chancroid about as well as the writer who pronounces so dogmatically upon the question. The question of the excision of chancres must be reviewed to-day in the light of modern bacteriology, and is still *sub judice*. "Classical writers" cannot help us to determine it.

Leloir,⁵⁷ contributes two observations upon the excision of the primary lesion of syphilis. In the first case the incubation period was three weeks. The woman from whom the patient contracted syphilis was known to have the disease. The sore was five days old, and was located on the free border of the prepuce. It had

the typical appearance of a syphilitic lesion. There was slight enlargement of the inguinal glands; this, the patient stated, was always present. The chancre was excised and the wound healed kindly. Microscopic examination showed the typical lesions of syphilis. This operation was performed in 1884, and since then no manifestations of a secondary or tertiary form of the disease have been observed. In the same article a communication from Lenger is cited. In 1884 he destroyed, by means of the thermo-cautery, a chancre which was located on the prepuce of a man. The woman from whom this patient was infected was examined, and found to be syphilitic. No secondary or tertiary symptoms developed. The excised sore had all the characteristics of a syphilitic lesion.

Treatment of Simple Chancre.—Du Castel,⁹ recalls the fact that Ricord habitually employed the charcoal and sulphuric-acid treatment, and obtained from its use very extraordinary results. He draws attention to the more recent methods of treating the disease, also calling attention to the use of Canquoin's paste.

Diday and Fournier recommend the employment of a solution of nitrate of silver, and the latter has found that the application of a 3-per-cent. solution produces excellent results. The lesions should be dressed with a tampon of absorbent cotton dipped in this solution, and renewed three times a day. With this treatment simple chancre should be cured in from three to six weeks; it may be advisable to apply not only antiseptic washes, but oxygen-water and solutions of chloral or Labarraque's solution.

GENERAL TREATMENT OF SYPHILIS.

Szadek⁹ states that Kaposi treats the primary sore, whether hard or soft, with mercurial plaster; he is opposed to the excision of the chancre, nor does he institute antisyphilitic treatment until the roseola appears, since he holds that the so-called preventive treatment is often followed by cerebral symptoms. Inunction is considered as the most efficacious method of treatment, although subcutaneous injections are regarded as more exact. If mercury is used endermatically, only soluble preparations of the drug should be employed. The iodine and sulphur baths are recommended as means of preventing relapses after primary relief of symptoms, and

hydrotherapy in general is strongly advised. Syphilis is characterized as eminently curable.

Althaus, ⁹_{Aug. 15} in considering the treatment of syphilis of the nervous system, believes that prophylaxis is of prime importance. This consists in excision of the primary sore and, after the appearance of the secondaries, three months' mercurial treatment. He believes that the drug, given in this stage of the disease, acts as a true germicide, and the general condition is as uninjured as though the patient never had the disease. If such treatment has not been followed nervous manifestations are possible, and where there is a neurotic tendency there is often a probability of the disease manifesting its effect in this way, especially when there are present such predisposing causes as great fatigue, exposure, injuries to the head, or sexual excess. After the mercurial course is finished, the nervous system of the patient should be braced up in every possible way.

When nerve syphilis has once manifested itself, periodic and long-continued hypodermatic injection of small doses of soluble, non-irritant preparations affords the best means of treatment. Carbolized mercury-cream is the preparation Althaus prefers. This is made by rubbing up metallic mercury with lanolin, and afterward adding to this mixture carbolized oil. This preparation is perfectly homogeneous, very stable, gives no pain when injected, occasions no swelling or abscess, is very efficacious, and does not cause stomatitis or dysentery, if the dosage is watched. The galvanic current Althaus considers the most important remedy in the treatment of secondary lesions and for the relief of distressing symptoms.

Petrini ⁹_{Aug. 15} believes that tannate of mercury, used internally, does not unduly irritate the gastro-intestinal tract or affect the economy in general; nevertheless, it acts with sufficient energy to produce a prompt involution of syphilitic manifestations. It can be given for any length of time without injuring the general health. It is mainly eliminated by the saliva, and only to a small extent in the urine. He gives a pill containing $\frac{2}{3}$ grain (0.044 gramme) of tannate of mercury, made up with extract of gentian, at meal-time. In ten days the dose is doubled, the patient being treated in this way for twenty-five or thirty days, or until the symptoms of the disease have passed off. Büchler ⁹_{Aug. 15}

employs salicylate of mercury internally, prescribing $\frac{1}{3}$ grain (0.022 gramme), in pill form, three times a day. This is followed by rapid involution of cutaneous manifestations. In 3 of 32 cases slight symptoms of mercurialism were observed. This preparation is alleged to be less irritating than the protiodide. It seems to act rapidly upon the enlargement of the spleen, though the general lymphatic enlargement is not so quickly modified as is the case when protiodide is employed. Szadek adds his testimony to that of Büchler as to the value of this preparation of mercury.

Quinquaud⁹ treats syphilis by means of external applications. The formula for these is given in the ANNUAL (vol. iii, F-38, 1891). After applying the plaster in the region of the spleen, mercury can be detected in the urine about the fourth day. The method is clean and efficacious. Hypodermatic injections are still being widely employed. Of the various preparations advised, the salicylate seems to be chiefly recommended by those who advise insoluble preparations. Gold, Lindeborn, and Lezius all commend this salt. Szadek also recommends this preparation of mercury, employing for injections the following mixture: Salicylate of mercury, 15 to 24 grains (0.97 to 1.55 grammes); mucilage, 8 grains (0.52 gramme); distilled water, $5\frac{1}{2}$ drachms (21.5 grammes). Of this, 15 minims (0.97 gramme) are injected, the medication being repeated every three or four days. The benzoate of mercury, the succinimide, the hydrochloric gluten-peptone sublimate, the oxicyanide, the black oxide, the gray oil, all have their advocates. Szadek warmly commends iodol as a substitute for iodide of potassium in the treatment of syphilis. He employed the drug continuously for two or three months, in doses of from 8 to 16 grains (0.52 to 1.04 grammes), two or three times a day. He found it harmless, tasteless, and odorless. It produced no disturbance in the intestinal tract. The therapeutic results were most satisfactory. In tertiary syphilitic ulcers it was found to be valuable for external application.

Köbner⁴_{Dec. 29, '90} declares very distinctly for the excision of the primary sore, altering his original opinion of this matter, on the basis of a number of successful cases. He believes the results would be better if excision were combined with the use of the thermo-cautery. When chancre is already accompanied by enlarged inguinal glands, operation, with the idea of aborting the

disease, is hopeless, excepting in those cases where only one or two superficial glands are involved. The preventive treatment of syphilis—that is, the administration of mercury during the period of primary sclerosis—is, as a general rule, not commended, and should be limited to cases in which it is necessary rapidly to cure the primary lesion. Fournier's prolonged intermittent mercury treatment is, according to Köbner, in many cases unnecessary. In fact, mercurialization, continued for years, may produce profound changes in the organs of digestion, the kidneys, and the nervous system. A regional employment of mercury is commended, as often causing the disappearance of lesions when the systematic administration of the drug accomplishes little or nothing.

Neumann⁸⁴_{Nov. 29, '90} is fully in accord with Fournier in stating that a large majority of cases are entirely cured; though he considers that Fournier's percentage (95 per cent.) is too high. He holds that the so-called preventive cure—that is, the beginning of the mercurial treatment on the appearance of the chancre—delays the appearance of the secondaries and causes them to assume a milder type, since early treatment lessens the number of infecting foci. After fifty days' mercuric treatment, there should be an interval in which the patient is treated by steam-baths and by the administration of small doses of iodide of potassium. If, after a year and a half, no further symptoms are present, treatment can be suspended until the appearance of some manifestations. The treatment should last only for two years, and should not be continued after that unless there are evidences that the disease is not thoroughly under subjection. For the first treatment inunctions are the most potent. In cases of light recurrence internal medication or hypodermatic treatment is indicated. As a hypodermatic medication, Zittmann's decoction is, perhaps, best, since it has a distinct diaphoretic action.

Fournier's scheme of treatment runs as follows: 1. Two months, mercury; one month's interval. 2. Six weeks to two months, mercury; three months' interval. 3. Six weeks to two months, mercury; four to five months' interval. 4. Four to five weeks, mercury; seven to eight months' interval. This treatment is continued for two years; ten months' mercury treatment are interrupted by fourteen months' rest.

Ricord continued medication during the first two years after

infection, with intervals of four and eight weeks, thus allowing for ten months' treatment and fourteen months' rest. During the intervals of treatment, and also after the treatment is completed, he commends the employment of iodide of potassium. Martineau adopts the following scheme of treatment: 1. Three to four months, mercury; five to six months, iodide of potassium. 2. Two months, iodide of potassium; one month's interval. 3. One month, mercury; three months, iodide of potassium; three months, sulphur-water. In the third year: four to six weeks, mercury; two months, iodide of potassium; two months, sulphur-water. The treatment is renewed if symptoms show themselves. Mauriac gives daily, in the first week of the appearance of constitutional syphilis, 1 of Sédillot's pills; the next week he gives 2 pills daily, and, for the next two months, 1 daily. Sédillot's pills contain a little short of 2 grains of mercury ointment. In the second year, he uses Van Swieten's solution. This is an alcohol-water solution of bichloride of mercury (1 to 1000). In place of this, he sometimes employs the iodide of potassium, in from 8 to 15 grains (0.52 to 0.97 gramme) a day. If the iodide does not seem to affect the tertiaries rapidly, it should be substituted by mercury. Sulphur makes the absorption of mercury easy, and favors its elimination. It may be employed either in baths, or may be given, internally, in milk.

Turati has arranged a scheme of treatment, as follows: (1) fifty sublimate injections, $\frac{1}{8}$ of a grain (0.022 gramme) to each injection, two months' pause; (2) fifty sublimate injections, three months' pause. This treatment is continued, with pauses of increasing intervals, for three years.

Neisser continues the treatment, in all, for four years. His treatments are intermittently energetic and mild. The first is vigorous, and begins with injections of the insoluble forms of mercury.

Neumann, ⁸⁴_{Nov. 22, '90} after a comparison of cases treated by him in various ways, ends with the following conclusions: 1. Since there are many observed cases in which the patient, having once been cured, remains well; and since there are, moreover, cases of re-infection observed, even within two years of the first attack; and since there are large numbers of cases of permanent cure of syphilis following symptomatic treatment, it seems sufficiently

proven that this disease can be treated in ways other than the intermittent method, and that, hence, this last is not the only proper means of treating the disease. 2. Since the cure of syphilis is only exceptionally attained within the first two years, and recurrence seems to be the natural course of the affection, a long, symptomatic treatment seems to be fully justified. 3. The exclusively symptomatic treatment of syphilis is justified only so long as the disease is considered as incurable and as the medication is considered efficient against the symptoms, and not as a specific against the disease itself. 4. Since in the present day syphilis is without doubt curable, and since the iodides and mercury are known to be efficient, not only in ameliorating the symptoms but in acting upon the disease itself, long-continued treatment seems indicated. The fear of injuring the system through repeated courses of mercury and iodide is shown to be unfounded. It is, however, recognized that, according to the peculiarities of the individual, an excessive quantity of mercury may be taken into the organism, under which circumstance the continued use of the drug not only seems to be without avail in its effect on syphilitic manifestations, but seriously affects the general health. 5. There are, as yet, no extensive and reliable statistics upon the value of the intermittent treatment; nevertheless, cases are observed which have been subject to this treatment, some of whom have remained free of the disease, others who have suffered from various manifestations, thus showing that the results do not widely differ from those following other methods of treatment. By a combination of the preventive treatment—that is, inunctions on the appearance of the chancre—with prolonged medication, a favorable course of the disease was noticed in single cases. The result, however, varies in this as in every other method of treatment. There seems to be no reason for concluding that any method of treating syphilis should be adopted to the exclusion of others. Before the old methods are cast aside for the new, it must be proven that the latter are better. In syphilitic cases preventive treatment succeeds in some, symptomatic treatment in others. At times the intermittent treatment seems best, continued for the first two years, combined with local treatment; yet no method is so firmly based upon invariably successful results that it is entitled to first place under all circumstances. The intermittent treatment is, however, partic-

ularly indicated when syphilitics contemplate marriage, or if they are suffering from the latent form of the disease, and desire to lessen the chances of transmitting the malady to their offspring.

E. Kreis ¹³³ reviews, from a continental stand-point, the present treatment of syphilis. In regard to the excision of the primary sore as a means of preventing general infection, favorable results have been claimed by Neisser, Unna, Jullien, and Leloir, while Neumann, Ricord, and von Sigmund believe it valueless. It can be said that we are, in general, unable to abort syphilis by excision of the primary sore; nevertheless, in selected cases it may be indicated under the following conditions: (1) absolute surety of diagnosis; (2) possibility of early operation before any of the glands show signs of infection; (3) that the induration be sharply defined, so that it may be wholly removed without leaving surrounding infected tissue. As regards the propriety of beginning constitutional treatment during the primary stage, Fournier, Mauriac, Jullien, Schwimmer, and others hold that it prevents the appearance of secondaries or causes them to pursue a milder course. Others, however, as Doutrelepon, Köbner, Kaposi, Unna, Neisser, and Leloir, hold that the appearance of secondary symptoms is only deferred, and when they do appear they pursue a more obstinate and severe course. The author believes, with Neumann, that, while by treating expectantly the skin symptoms are more marked, when early treatment is instituted obstinate affections of the mucous membrane and iris are apt to occur in their place. Early constitutional treatment is only advised in very extensive and obstinate lesions. In reference to the particular medicament to be used, inunctions give the best therapeutic effect with the fewest accompanying disturbances. Hypodermatic injections, in view of the uncertainty of their action, are not to be recommended. Fournier advises intermittent mercurial treatment, to be continued for three or four years, and he has been followed by Leloir, Lesser, Finger, Kopp, and, above all, Neisser; but others, as Lang, Diday, Caspary, and Köbner, oppose this, and restrict it to exceptional cases, as it appears to be for most cases not only superfluous but harmful. The practitioner must decide this point according to the peculiarities of the special case. Syphilis can be regarded, if not in all cases as an absolute, at least as a relatively curable affection.

The specific treatment, according to Leloir, ²² _{May 20} should not be

prescribed before the appearance of secondary symptoms, and preference should be given to mercurial frictions: a drachm (3.80 grammes) of mercurial ointment rubbed into the thighs daily for a fortnight, then a cessation for another fortnight, and so on for ten months, after which period the frictions should only be made ten days a month, until the end of the second year. If any cephalalgia persist, 40 grains (2.59 grammes) of iodide of potassium daily, for a few days, will remove it. The internal administration of mercury should be reserved for married women who do not suspect the nature of their malady, for those whose skin is very tender, and for those who want to conceal their disease. Leloir recommends, in order that the skin may not be irritated by the mercury, that the ointment be prepared with benzoated lard, and that, twelve hours after the rubbing, the part be washed and powdered.

Hutchinson,¹⁵ states that he still uses one form of mercury to the almost total exclusion of all others, and still prefers to modify the frequency of the dose rather than the dose itself. Respecting the gray powder (*hydrargyrum cum creta*), he is certain, from long experience, that it is efficient, and that fewer inconveniences attach to its employment than to any other preparation of mercury. Blue pill, which comes the nearest to it, is both less efficient and more liable to disagree. Simplicity of prescription is an advantage not to be despised in the busy life of a surgeon. It saves a great deal of mental wear and tear to be able to rely upon simple remedies, and to habitually prescribe the same thing for the same disease. Thus, although he has not the slightest doubt as to the efficacy of mercurial inunction, mercurial baths, hypodermatic injections of mercury, or the internal administration of its numerous salts, he never, for ordinary cases, uses any one of them. A pill containing 1 grain (0.065 gramme) of gray powder, with enough opium to prevent diarrhoea or griping, is his almost invariable prescription. This the patient is instructed to take at intervals, varying from three times a day to every three or even every two hours, according to its effect upon him. He is at the same time instructed to abstain from fruit, green vegetables, and everything else in the least likely to cause diarrhoea. There are, it is to be admitted, certain patients who cannot take mercury in doses adequate to the cure of the disease. If the susceptibility occurs in the form of tendency to diarrhoea, it can usually be met by the

liberal combination of opium with the gray powder and by strict attention to diet. If these measures do not suffice, we may then have recourse to inunctions or the vapor-bath. Cases in which mercury produces or aggravates sores on the tonsils or in the pouches of the cheeks are more difficult to manage, for in these it matters but little in what form the remedy is used. A combination of iodide of potassium with a very small dose of mercury, or even an entire substitution of the latter by the former, may be necessary. There are a few patients, fortunately a very few, in whom mercury, even in small doses, produces debility, emaciation, and neuralgic pains; in such, a combination of quinine and iron with the specific will be necessary. As to tertiary syphilis, Hutchinson says that, while he does not in the least wish to under-rate the extent to which it still prevails or the importance of some of its manifestations, he feels sure that much needless misery has been caused by the loud assertion of the incurability of a malady which is, in 19 cases out of 20, easily amenable to treatment by the iodide of potassium. Having recently been requested by an insurance society to formulate some rules for its guidance in reference to the acceptance of the lives of those who have suffered from syphilis, he advised that patients suffering from active secondary symptoms at the time of their application should always be made to wait until the symptoms disappear. His reason for this was, that it is always desirable to know whether or not the syphilitic patient bears specific treatment well, and also whether he is willing to be careful and attentive in following out the treatment. The need for caution even here is by no means imperative. He does not think that an insurance office would do a bad business if it were to undertake, at ordinary rates, young men in the early stage of syphilis.

As regards those who offer themselves for insurance free from symptoms, but with the history of former syphilis, he would certainly not advise an insurance office to allow the fact to make any difference. If the patient has become definitely the subject of tertiary lesions, or if, owing to idiosyncrasy or imperfect treatment, his secondary stage has been allowed to linger, then it must be admitted that there is reason for being cautious. Even in this case, however, his experience has been that the threatened man lives long. The number of those whose lives have really been

shortened by syphilitic maladies has been, so far as his own personal experience goes, extremely small.

Judging from my own experience, they appear quite as likely to live as long as others, and the effect of treatment seems to be, in not a few instances, to improve the health rather than otherwise.

Besnier¹⁰⁰ arrays himself on the side of those opposed to the preventive treatment of syphilis, mainly upon the ground that by this procedure diagnosis is obscured. He objects to the treatment of syphilis as a disease, but, since it manifests itself in all degrees of violence in various individuals, he would rather treat each individual upon the merits of his own particular case.

Fournier,⁷⁶⁰ in commenting upon the *complications* liable to arise in the use of mercury, says that the special means of avoiding salivation are four in number: 1. Examine the mouth before the treatment, and, if necessary, have the patient submit to the dentist's care. 2. Carefully watch the condition of the mouth, and minutely inspect the retromolar regions. Enforce severe buccal hygiene, cleanliness of teeth, the use of gargles. 3. Warn the patient of the possibility of buccal irritation by the mercury, in order that he may arrest the treatment in time. 4. Suspend the treatment at the first alarm.

Mercurial eruption appears particularly as an erythema, generally produced by the use of pomades, more rarely by internal treatment. It is excessively rare, and nearly always an accident of idiosyncrasy. To avoid the gastric and intestinal troubles, we must vary the preparations, proportion the doses according to the tolerance of the patients, and associate opium with the mercury to insure tolerance. We should not exceed five or six weeks of continuous treatment. If we have to deal with stomachs that absolutely refuse to support the medicament, we should have recourse to inunctions. The nutritive troubles are much more serious. Mercury determines chloro-anæmia or marasmus under two circumstances: 1. When administered in too large doses, in a manner to disagree with the stomach and to cause diarrhœa. 2. When administered for too prolonged a period. The treatment should be often interrupted. But these accidents are the exception. When the mercurial treatment is well directed the patient experiences marked benefit.

Fournier⁹⁰ employs for frictions a "pomade" composed of equal parts of mercury and fresh lard. It is necessary to have the ointment fresh, for it soon becomes rancid, and then irritates the skin. Four grammes (1 drachm) are sufficient as a dose for an adult. Women are more susceptible to the influence of mercury than men, and stomatitis is much more frequent. In the newly-born, in ordinary cases, he uses 2 grammes (31 grains); in severe cases, 3 grammes (46 grains). In severe cases, where it is often necessary to act quickly, he has, at times, reached doses of 10 and 12 grammes (2½ to 3 drachms). He mentions the interesting fact that certain mineral waters give a patient the power of supporting larger doses of mercury. He gives the following formula: Double mercury ointment, 30 grammes (1 ounce), to be divided into 7 parts. The frictions are made at evening, just before going to bed. The surface of the thorax, just below the axilla, is the spot to be preferred. He recommends avoidance of the axilla, because absorption is too rapid where hair-follicles exist. To avoid all irritation, the ointment should be rubbed into one side on one day and into the other side on the next. Friction should be vigorous. Fifteen minutes are necessary for 4 grammes (1 drachm) and thirty minutes for 8 grammes (2 drachms). When the friction is finished, the region is covered with a cloth moistened in warm water, and a bandage is put over the cloth. When the ointment has remained for eight hours in contact with the skin, it is removed with soap; the skin is then wiped and powdered with rice. The number of frictions necessary varies, but it is rarely required to order daily frictions for a longer period than three weeks. In women, stomatitis is very common at the end of this time, however much care is taken of the mouth. It is then necessary to give the patient a few days' rest, after which the frictions can be renewed.

Jelks⁶¹_{Dec. 20, '90} expresses his confidence in a 50-per-cent. ointment of mercury, 1 drachm (3.97 grammes) of which should be rubbed in every night. Where this treatment cannot be carried out, he uses the protiodide in ¼-grain (0.016 gramme) doses. He begins his iodide of potassium in doses of 15 grains (0.97 gramme), three times a day, increasing 1 grain (0.065 gramme) a day until the drug has accomplished its effect. He has carried the dose up to 1000 grains (64.8 grammes) a day.

Hypodermatic Medication.—Migneco⁵⁸⁹_{v.2,p.400} reports the results obtained, in the Catania Clinic for Specific Diseases, with thymol-acetic mercury (hydrargyrum thymolo-aceticum) in the treatment of syphilis. The remedy was administered by injection in the gluteal region; each time 0.075 gramme (1½ grains) of the preparation, as follows, was injected:—

| | | |
|---------------------------|-------|---------------------------------|
| R Hydrarg. thymolo-acet., | . . . | 1.50 grammes (23½ grains). |
| Mucilag. gum arab., | . . . | 0.50 gramme (7½ grains). |
| Aquæ dest., | . . . | 20.00 grammes (5¼ drachms).—M. |

In the reported cases 250 injections were made. The average duration of the treatment was thirty-three days. An exact examination of the urine revealed the fact that mercury could be found, in moderate quantities, eight hours after an injection had been made. No local reaction was occasioned by the treatment. In comparison with bichloride of mercury, it is far superior, although insoluble. Its action is much more prompt, and relapses apparently occur less frequently. Schleichszadek⁶⁷_{Dec.15,70} has experimented with thymolate of mercury in cases of recent and of inveterate syphilis. The formula he employs is the same as that given by Migneco. The injections are usually performed every three or four days, preferably in the gluteal region. Eighteen cases were so treated, the treatment in 1 lasting for forty-two days, in the others for twelve days. Squamous and pustular affections of the most chronic cases, and specific cutaneous affections, disappeared with more rapidity than could have been affected through the employment of other mercurial preparations. He also claims to have obtained a most remarkable curative action in syphilitic laryngitis with complete aphonia, the symptoms rapidly disappearing after the first injections. Finally, these intra-muscular injections have never been followed by any local inflammatory action, induration, nor abscess, while stomatitis occurred but rarely, and was then in no case severe.

Neumann,³⁷⁸_{Aug.19} after a careful discussion of hypodermatic medication in the treatment of syphilis, states that, from an experience upon about 500 patients in his clinical practice and a large number of private patients, neither injections with the soluble nor insoluble compounds of mercury prevent the recurrence of syphilitic symptoms. When used as a preventive treatment, they are simply able to retard, for some weeks, the constitutional symptoms, with the exception of

the ganglionic enlargement, which is never prevented. They are not particularly efficacious in grave forms of syphilis, particularly brain manifestations of the disease. Retinitis and iritis are not materially benefited; inunctions have frequently to be substituted for injections when these complications appear. If hypodermatic injections are employed, he prefers the solution of bichloride with chloride of sodium in water. Among the insoluble compounds, he gives the preference to thymolate of mercury.

Eich¹¹⁶ describes the method of treatment by intra-muscular injections of the salicylate of mercury, based on some 375 cases, and extending over a period of two years. The drug was used, suspended in liquid paraffin, in the proportion of 1 in 10. The injections were made into the gluteal region, after the skin had been carefully cleansed. The amount of salt injected was 0.1 gramme ($1\frac{1}{2}$ grains), repeated weekly. In the case of the neutral salt, the dose was raised to 0.12 or 0.15 gramme ($1\frac{1}{2}$ to $2\frac{1}{2}$ grains), and the injection made twice a week. There were never any unpleasant consequences, and no cumulative action was observed at the site of the puncture; no redness of the skin, and in only 1 out of 2049 injections did a small abscess appear. In this respect the salicylate is superior to other preparations. A slight stomatitis appeared only ten times, but cleansing of the mouth was rigidly enforced during the treatment. On an average, 7 injections were needed before the symptoms disappeared. With the larger doses the treatment lasted, on an average, twenty-seven days. The effect of the remedy was prompt, but in a relatively large number of cases there was no result, and other treatment had to be adopted. There was a return of the symptoms in 34 per cent. of the cases, and this occurred earlier, and was more severe than in those treated in other ways.

Zälëneff, of Kiev,^{503 90}_{N.S., July}, publishes a careful report on 104 cases of syphilis treated by him with corrosive sublimate. The mercuric bichloride is first mixed with vaselin, then oil of vaselin is added in sufficient quantity to make an emulsion containing 22 per cent. of corrosive sublimate. The injection preparation contains from $\frac{1}{2}$ to 2 grains (0.032 to 0.13 gramme) of the sublimate. In some cases an emulsion of the bichloride (36 grains—2.33 grammes) in oil of vaselin (1 ounce—37 grammes) was employed, the dose being 1 grain (0.065 gramme) of the sublimate. In either case the emul-

sion was warmed in hot water, and then thoroughly shaken just before using. In the case of $\frac{1}{2}$ -grain (0.032 gramme) doses the injections were repeated once every four days; in that of 1-grain (0.065 gramme) doses, every six days; and in that of 2-grain (0.13 gramme) doses, every ten days. In all, 915 injections were made, 31 patients being treated with $\frac{1}{2}$ -grain doses, 33 with 1-grain ones, and 40 with 2-grain ones.

The following are the principal deductions from the clinical inquiry:—

1. In the case of 2-grain injections, all syphilitic manifestations disappear on an average after five or six *séances*; in that of 1-grain injections, after eight or nine; and in that of $\frac{1}{2}$ -grain injections, after twelve or fourteen.

2. A local reaction (at the site of the injection) is mostly but trifling.

3. As to the influence of the injections on the bodily weight, the latter fell in 39 out of 74 patients examined, while in 35 it increased during the course.

4. As to the bodily temperature, in 40 per cent. of cases the first injection of the sublimate "suspension" was followed by a rise. Subsequent injections did not make any impression on the temperature.

5. Of toxic phenomena, were observed gingivitis, abdominal pain, and diarrhoea, with blood-stained stools.

6. Distinct traces of the metal appeared in the urine in about twelve hours after the first injection; after each subsequent dose the proportion of mercury markedly increased for from one to three days.

7. On the whole, injections of suspended corrosive sublimate in large doses afford a convenient and energetic method of treatment of syphilis. Its only drawback consists in occasional irritant effects on the gastro-intestinal tracts.

Moncorvo and Ferreira^{118, 22} describe their method of treating cases of congenital syphilis by means of injections of mercurial salts. Among the various mercurial preparations which they tried upon 47 children to whom were given 259 hypodermatic injections, the best appeared to be those of gray oil for the insoluble salts and those of the sublimate for the soluble. The total number of the oil injections was 94; the quantity injected varied from two-fifths

to the whole of a Pravaz syringe. One of the children treated was only 38 days old. Only once was there any reaction at the point of puncture. The injections were much better tolerated than injections of calomel or yellow oxide of mercury suspended in vaselin. The sublimate was employed in nine children aged from 3 months to 14 years. The doses injected did not extend beyond 1 to 2 milligrammes ($\frac{1}{84}$ to $\frac{1}{82}$ grain) for each injection. The mercurial salts were dissolved in distilled water, without the addition of any other substance. The injections, to the number of 34, were not painful, and were always readily tolerated. The sublimate seemed less painful and more efficacious than the salicylate of mercury. The injections were always administered under antiseptic precautions. The results obtained have been generally favorable, and the procedure seems to be in no way inferior to other methods of administration. Cutaneous syphilides, papules, pustules, gummata, etc., were all promptly influenced by the hypodermatic treatment.

The tolerance displayed, so remarkable in the absence of toxic signs, either local or general, is in accordance with the facility with which children are wont to bear the administration of mercury.

Electric Baths.—Kronfeld,⁸⁴ describes an electric bath so constructed that the tub in which the patient lies is divided into two compartments, the water in each being separated, so that a current of electricity carried into one can be transmitted into the other only through the patient's body. When these compartments are filled a powerful stream of electricity may thus be utilized for the purpose of causing the absorption of mercury. On the basis of numerous experiments and examinations of urine, it was found that by means of these electrical baths, about 3 drachms (11.66 grammes) of bichloride of mercury being added to each, the rapid absorption of the medicament could be brought about, and, as a consequence, there was a disappearance of specific symptoms.

Waldo¹⁰¹ recommends the use of electrolysis in condylomata, if drying powders, such as calomel, boric acid, and tannin, have failed.

Miscellaneous.—Heilmann⁵⁸⁶ selected 84 cases of recent constitutional syphilis, and subjected a certain proportion to calomel injections, another portion to inunctions, a third portion to treat-

ment by the mouth. The inunctions were of mercurial ointment, from 30 to 45 grains (1.94 to 2.93 grammes) a day. The mean duration of the treatment in all the cases was 49 days. The minimum duration of treatment, which was 41 days, was observed in young subjects between 16 and 20 years of age. In those older than 30 years the treatment was longer, as it was also in those under 16 years. Of 348 treated by injections of calomel, the mean duration of treatment was 46 days. Of 246 treated by inunctions, the mean duration of treatment was 51 days. Of 252 treated by mercury by the mouth, the mean duration was 56 days.

Heat.—Kalachnikoff, ²¹¹_{Oct. 18} as the result of personal experience in the application of *heat* in cutaneous syphilides, announces the following conclusions:—

1. Heat is an efficient means of hastening the resolution of skin manifestations of syphilis.

2. The rapidity of the resolution in the use of heat depends upon the peculiarities of the patient.

3. Recurrences *in loco* are observed under treatment by heat, but these are not so intense as are observed in the regions not treated by this method.

Balzer ¹⁵²_{Jan. 9} warmly commends *massage* as a means of causing the disappearance of syphilitic eruptions, especially when such manifestations of the disease do not yield to constitutional treatment. His conclusions are based on practical experience with a number of cases.

Augagneur ⁴⁷⁹_{Oct.} commends the employment of *bromide of potassium* in syphilis accompanied by laryngeal lesions sufficient in extent to excite some dyspnœa. Here, in place of the iodide, which may, for a time, increase the local trouble, bromide may be used with advantage. It diminishes the nervous susceptibility and lessens the dyspnœa by controlling reflexes. At the same time that the bromide of potassium is given, mercury should be administered. In tertiary syphilitic laryngeal involvement his treatment is as follows:—

1. Frictions every day with 2 drachms (7.78 grammes) of mercurial ointment.

2. The administration of small doses of bromide of potassium to control spasm.

When the dyspnœa is overcome, a mixture of the bromide and iodide of potassium is indicated, equal parts of each.

ORTHOPÆDIC SURGERY.

By LEWIS A. SAYRE, M.D.,

AND

REGINALD H. SAYRE, M.D.,

NEW YORK.

POTT'S DISEASE.

THE most prominent new procedure in the treatment of Pott's disease is the proposal of Hadra, of Galveston, Texas,⁷⁶⁰ to wire the vertebræ together. He performed this operation on a man who had fallen, striking on his buttocks. Immediately after, he felt intense pain in his neck and was unable to move it. On examination, the sixth cervical vertebra was found pushed forward and turned around its vertical axis to the right, whilst the spinous process of the seventh vertebra appeared unusually prominent. Patient could not open his mouth more than an inch. Extension was made by the head, and as the parts seemingly returned to their normal position the neck was put in a firm cravatte. Patient, from reasons of no medical interest, left the hospital a few days after his admission, and returned to his former occupation, constantly wearing his apparatus, getting along well enough with an occasional hypodermatic injection of morphine. But once, when he imprudently bent his neck in a rapid and forcible way, the cravatte having been left away, he fainted, and when he recovered consciousness could not stand upright. His head and neck were turned to the right, and kept perfectly stiff; right hand became numb, right arm weak; girdle pains around his upper abdomen; bladder not fully under control; slight priapism. In such condition he came to the John Sealy Hospital on November 1, 1890, 10 months after the first accident. His face flushed up on the slightest provocation; his mouth could not be opened over an inch; the left upper portion of the trapezius muscle was hard and protruding, forming a tumor; his right hand colder than the left; extreme hyperæsthesia on the right side; head was rolled around

(G-1)

to the right, and the vertebræ in same position as on the first observation; muscles, however, reacted alike on both sides of the body to either current. Patient was put under chloroform, not being able to stand any manipulation without an anæsthetic. Head and upper portion of neck very movable, and crepitation distinctly heard. Reduction was easy, and the stiff cravatte was applied again. In spite of frequent adjustment and modification of the retaining apparatus, patient steadily grew worse. Pains in back, arms, and around abdomen became unbearable, and walking impossible. He was in such a pitiable condition that he insisted upon any operation which would give the faintest hope of relief. Hadra, therefore, cut down on the place of injury, December 22, 1890, and, not finding any loose bones, severed the ligamentum nuchæ and the interspinous ligaments transversely in several places, so as to expose the spinous processes fully, and also in order to remove the interference of the, perhaps, thickened and contracted ligaments which could have acted as an impediment to the replacement and retention of the dislocated parts, exactly as in other fractures or dislocations. He is satisfied that this part of the operation was not only unnecessary, but that it caused all the following inflammatory symptoms, as a good deal of lacerating was unavoidable. The main aim of the operation, the wiring of the sixth and seventh spinous process was done with silver wire, carrying it four to five times around in a figure-of-eight. The wound, which extended from the occiput down to the first dorsal vertebra, was then closed, a small drainage-tube inserted right over the place of wiring, and the stiff cravatte re-applied. Patient did not improve for several days, but then gradually got better. After some weeks it was thought that the wire had become loose, because he began to exhibit some of his former symptoms. He was put under chloroform again, the wire removed, and a new one adjusted.

On this occasion it was easily seen that the lower end of the fractured spine slipped away from the upper for about one and one-half inches to the right. From this time improvement went on more rapidly. Patient was able, twelve weeks after the operation, to move his head in a normal way in every direction without pain. He could open his mouth fully, walk as well as anybody else; no headache; no trouble with bladder or bowels. The right arm

remained somewhat weaker, but was otherwise normal in all its functions and of normal sensation.

Subsequently the patient became worse again, and has now considerable pain in his right arm and shoulder. The spinous process of the sixth cervical vertebra is very tender on pressure, and requires further attention, as the probable cause of the new trouble. Otherwise he is well, and can make use of his neck without any difficulty.

The operation, as now practiced by Hadra, is as follows: A good, long, skin incision, the centre of which should be over the seat of fracture, is made; the muscles on either side of the spinous processes are then lifted up and drawn aside with blunt instruments, but not more than to allow one to feel the contours of the bones; then a stout, curved needle, armed with wire, is carried through the interspace between the spinous process of the broken vertebra and that of the next upper one, as deep as possible; brought out, entered again into the next inferior interspace; brought out on the other side; entered then again into the next lower interspace; carried around the spinous process of the vertebra, below the fracture, and again carried through the middle interspace, and, meeting the wire where it entered, is well twisted together to a knot; in short, a figure-of-eight loop is carried around the spinous processes of the broken vertebra and that of the next lower one, which may be repeated as often as seems advisable. In the lumbar portion of the spine simple loops will suffice, as the processes are almost horizontal. The wound is then closed with or without drainage. Under certain circumstances, three or even more vertebræ may be fixed together.

All this can be done in a few minutes. The operation is nearly bloodless, involves no great laceration of tissues, and can be made thoroughly aseptic. The wires are well secured in their position by the ligaments, which remain undisturbed.

Wiring the transverse processes is more difficult. Here the muscles have to be lifted and drawn aside much more extensively. To avoid including nerves in the loops, Hadra thinks it would be best, first, to surround one process and then carry the thread to the next one, and again tie it by a loop, so as to have only one wire in the interspace.

Hadra proposes to adopt the same procedure in cases of Pott's

disease, and says that it will keep the inflamed parts at rest and protect them without the use of other means.

It seems to us that, from a theoretical stand-point, Hadra's procedure may have a limited sphere of usefulness in certain cases; but that it does not afford adequate rest to the inflamed bones; it does not prevent concussion; it does not prevent traumatism from lateral twists of the body, and does not adequately relieve the spine of the superincumbent weight of that part of the body above the point of disease, and, therefore, can be used only as an addition to mechanical support.

The great anxiety to operate in all cases of paraplegia in Pott's disease that was beginning to be shown last year has given rise to a number of reports of removal of the laminæ of the vertebræ for the relief of paraplegia, but without a very large number of cases of permanent relief, and the probabilities are that a large number have been operated upon about whom there is no report, as there was no relief. In many of the cases reported, the operators seem to have neglected the mechanical side of the question altogether, or else have been too impatient to await results. In many cases the point of disease lay in front of the spinal canal and was said by the operator to be inaccessible, and the wound was therefore closed; and the fact that the vast majority of these paraplegias recover without operative interference causes conservative men like Billroth to be very cautious about operating.

Reginald H. Sayre,¹ read a paper before the Orthopædic Section of the New York Academy of Medicine, in which he called attention to the importance of a thorough examination of the patient in suspected Pott's disease. He said that, although in childhood the signs of Pott's disease were usually so marked as not to be confounded with those of other troubles, in adults, especially in women, there were times when the diagnosis was not clear. In some cases of uterine displacement and ovarian disease the reflex pains, the posture, and the gait might simulate the symptoms of Pott's disease so closely as to be mistaken for them by competent observers. Several such cases had fallen under his notice. In the first case, the history of which he related, a lady, 26 years of age, had received an injury of the right hip, which was followed by severe pains in the back and lower extremities. These pains were worse at night, and were so severe that

she consulted a prominent Philadelphia physician. He pronounced the case one of Pott's disease, and applied a leather corset. This made her worse, and there was loss of power in the arms and legs. The jacket was then removed, and she was advised to rest in bed for two or three years, but this advice was not followed. Two prominent New York physicians made the same diagnosis, and various braces, and finally plaster, were applied without benefit. She was still wearing the plaster jacket when she first came to the author. She could then walk only with difficulty; she was bent forward, and every jar caused pain. There was rigidity of the spinal muscles, and she complained of the girdle sensation and of pains in the lower part of the abdomen and down the thighs. The uterus was found to be retroverted and bound down by adhesions. An Alexander operation, followed by the use of a pessary, faradism, and gymnastics restored her to health. Three similar cases are recited, and in summing up the subject the writer said that the description of these cases showed that the mistakes in diagnosis had been made by men of large experience, and he had, therefore, thought it worth while to call attention to the fact that reflex pains from pelvic irritation might easily lead one astray in considering cases of supposed Pott's disease.

Ridlon⁹_{Oct. 17} directs attention to syphilis as a cause of spondylitis. He says: "Spondylitis in very young children—that is to say, under 3 years of age—and spondylitis associated with chronic disease of some other joint, or in another portion of the spine separated by a healthy area, are, in my experience, more often syphilitic than tuberculous. Such cases always repay a careful examination and a strict watch for the appearance of other syphilitic manifestations, namely, nasal catarrh with the formation of reddish-brown crusts, suppurating otitis, corneal opacities, interstitial keratitis, Hutchinson's teeth, periostitis, cutaneous eruptions, and sores about the anus and genitals. In my experience, the most common associated symptoms have been the bone and joint lesions at some distant point, and the least common have been the skin eruptions.

"The treatment of syphilitic spondylitis should be both mechanical and medicinal; but the mechanical plays by far the less important part, and rest in bed or on some form of portable bed will be found to be more demanded than braces. Rest in the recum-

bent posture during the painful stage is absolutely essential, while the application of specially devised apparatus may be looked upon more in the light of a luxury than a necessity. The medicinal treatment consists of mercury and iodine. Large doses should be used; if the stomach will tolerate it, as much as $\frac{1}{8}$ to $\frac{1}{4}$ grain (0.0021 to 0.0027 gramme) of the bichloride or biniodide, with from 5 to 40 grains (0.32 to 2.59 grammes) of potassium iodide three or four times a day. If the stomach proves irritable, mercury with chalk in from 3- to 5-grain (0.19 to 0.32 gramme) doses and inunctions of blue ointment are advisable. Tincture of iodine in from 1- to 10-drop doses may be given. It will be found that these children usually bear these medicines in as large doses and as well as do adults."

Kashimura, ²⁰⁰ at the First Medical Congress of Japan, showed a bamboo jacket, made by fastening narrow strips of bamboo on a piece of cloth, which is then folded around the body and fastened in place by straps. It is stated that "the bamboo is flexible, easily curved when warmed at the fire, and retains its curve after it has cooled. Hence, any desired form of jacket can be constructed to suit exactly the spinal curvature and the form of trunk." The pictures accompanying the article show no signs of a waist in the jackets, which, if thus made, must fail in their object, namely, to lift off the superincumbent weight of the body from the diseased spine.

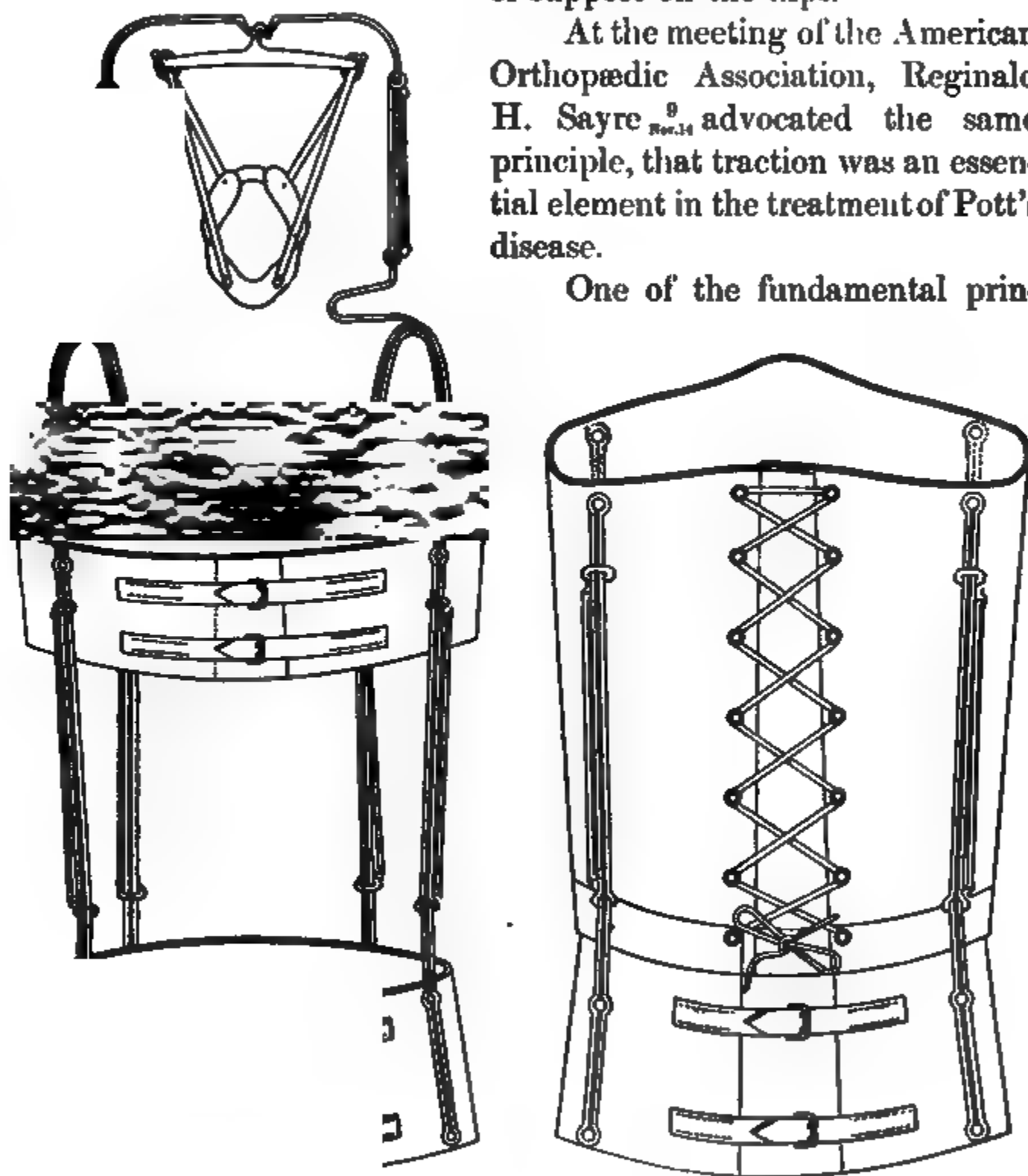
Stewart L. McCurdy ¹⁶¹ describes a corset made on the same principle as Wyeth's. It is composed of two segments, the upper of which fits the trunk snugly, while the lower rests on the pelvis. The upper segment is lifted from the lower by a double system of malleable-wire bars, arranged parallel and secured together at the proximal ends by a collar that slides over its fellow, and from which project hooks. The distal ends are fixed points, and are secured to the upper and lower segments of the jacket, near the edge, by rivets, two in front and two along the spine, as represented in the model. By throwing an elastic over the hooks projecting from the proximal ends, the distal ends are thrown farther from each other. These are so arranged that they can be extended, and thus relieve the weight of the body from the diseased area at the surgeon's will.

This traction or support is obtained in two ways: first, by the

elastic traction-bars as shown; second, by the use of the key and ratchet extension, as used by Sayre and others in the treatment of hip disease. In upper dorsal and cervical disease he uses a jury-mast somewhat like Davis's head-support, but which has its point of support on the hips.

At the meeting of the American Orthopædic Association, Reginald H. Sayre⁹ advocated the same principle, that traction was an essential element in the treatment of Pott's disease.

One of the fundamental prin-



MCCURDY'S SPINAL CORSET.
(*Pittsburgh Medical Review*.)

ciples in the treatment of all joint diseases is, so far as possible, to secure the absence of traumatism. In the spine, traumatism may be caused, first, by movements of the diseased parts; second, by the weight of those parts of the body, that are, when erect, above the point of disease; third, by jars, when walking; and,

last, by the reflex muscular spasm common to joint disease wherever situated. This muscular spasm is an effort on the part of nature to secure rest for the diseased joint, and when an apparatus, the surgeon's hand or any other means, secures this rest this reflex muscular spasm disappears. The care shown in the

gait of patients with Pott's disease, and the frequency with which they support the weight of the upper part of the body by resting their hands on the seat of the chair, etc., point most clearly to the necessity of relieving the diseased spine from the superincumbent weight, and protecting it as far as possible from concussion. It is because they act by lifting off the superincumbent weight more effectually than other means he prefers jackets passing completely around the body to posterior supports, which act merely by preventing motion, and do not diminish concussion or lift off superincumbent weight, unless they are provided with jury-masts. If, because of sores, or because the ilium is too small to afford a base of support, the case is not suitable to be treated in a jacket, traction in bed by head-straps and weight and pulley, or by elastic, or, better still, by means of the portable wire cuirass, should be used; and, in all

SCHMID'S SUSPENSION APPARATUS.
(*Balneologisches Centralblatt.*)

cases of paraplegia in Pott's disease, he advises faithful trial of traction and counter-irritation before proceeding to resection of the laminæ. In making traction, the feelings of the patient should be the guide.

To use Lewis A. Sayre's words when he introduced plaster-of-Paris jackets, seventeen years ago: "Raise the patient until he is comfortable; there stop, and keep him so."

LATERAL CURVATURE.

At the Tenth International Medical Congress, Schmid⁸⁷⁰_{July} showed a new form of self-suspension apparatus for lateral curvature. The ordinary head-piece is suspended from a rope, which passes through two pulley-wheels in the ceiling and terminates in a handle at each end.

The patient grasps the handles in each hand, with the arms fully extended above the head, and by pulling lifts himself from the floor, the weight being divided between the neck and arms. While thus hanging he performs various motions with the arms, according to the position of the curvature, as shown in the cuts.

Hoffa⁹⁰⁰_{21,22} has described an apparatus for reducing the curvature of the ribs in scoliosis, which consists of a strong framework, to which is fastened an iron band which encircles the patient's thorax.

SCHMID'S SUSPENSION APPARATUS.
(*Balneologisches Centralblatt.*)

From this, as a base of support, pads are forced against the projecting ribs by means of screws, with the idea of pressing against the convexity, and thus diminishing the curvature of the thorax. (See cuts, pp. 10 and 11.) Bradford⁹⁰_{Nov. 5} showed a somewhat similar apparatus at the meeting of the American Orthopædic Association in Washington. His apparatus was fastened to a chair, the patient sitting on this instead of standing, as in Hoffa's. In all these

efforts to push the ribs straight it must be recollected that the pressure must be directed away from the spine and not toward it, or else the force will be transmitted to the articular facets of the vertebræ in such a manner as to increase still farther the rotation of the spinal column. Stillman¹³⁹ has an excellent article on round shoulders, in which he advocates, amongst other measures, rowing with the head suspended by an elastic traction support. (See cut, page 12.)

TORTICOLLIS.

Royal Whitman¹⁴⁰ rejects the theory of Stromeyer and Diefenbach, that congenital torticollis is due to rupture of the sternomastoid at birth, with hæmatoma, myositis, and subsequent scar contracture. He recites the cases of 7 infants who had hæmatomæ of the sterno-mastoid without developing torticollis. In considering the significance of hæmatoma, so called, sev-

HOFFA'S APPARATUS FOR SCOLIOSIS.
(*Zeitschrift für Orthopædie*).

eral sources of error should be indicated, as leading to the present confusion on this subject: 1. A muscle shortened *in utero* may be ruptured at birth, thus presenting a deformity where the induration is a coincidence and not a cause. Such a case was reported by

Bruns at the last Congress of German Surgeons. 2. An inflamed gland, adherent to the muscle, with torticollis from nerve-irritation, may be mistaken for hæmatoma, as in the case mentioned. 3. Similar enlargements may in certain instances be of other origin than injury,—such as fibrous, sarcomatous, or syphilitic tumors, arising, it may be, *in utero*. Cases reported by Graser, Taylor, Hadra, and Holmes would seem to support this view. It is possible, too, that injury in a tuberculous or syphilitic child might give rise to a myositis sufficiently exaggerated to cause permanent arrest of development and actual shortening. From the history of a number of cases he concludes that the causes of congenital torticollis operate, in a majority of cases, before rather than during delivery.

According to Phocas, of Lille,¹¹⁸ acute torticollis is far

more common in childhood and youth than in adult or old age. He recognizes two main varieties: (1) acute torticollis following immediately a sudden movement of the head, and due to sprain

HOFFA'S APPARATUS FOR SCOLIOSIS.
(*Zeitschrift für Orthopædie.*)

of one or more articulations of the cervical vertebræ—acute traumatic torticollis; (2) acute torticollis following exposure to cold, and due to slight cervical arthritis or to muscular rheumatism—acute rheumatic torticollis. In a few cases the acute traumatic variety may be due to partial rupture of muscles. In either of the two above-mentioned forms clonic contractions may be superadded to the tonic contracture. The muscle involved primarily is usually the trapezius. As to treatment, hot applications are the best anodynes; massage of the contracted muscle is a more effectual

remedy, and often gives immediate relief, but Phocas recommends particularly the application of a collar in the following manner: The patient is placed in a Sayre suspension apparatus as for the treatment of cervical caries; he is then very slowly suspended partially. In this way the muscles are uniformly stretched, and their resistance gently overcome with little or no pain. A collar of moistened mill-board is now applied and retained in place by a few turns of bandage. The

STILLMAN'S ELASTIC TRACTION SUPPORT.
(*Medical Standard.*)

patient remains in the apparatus about ten minutes more, and when liberated is free from pain. In one case the collar was removed on the next day, and the symptoms had all disappeared.

John B. Deaver and Charles K. Mills²⁴²_{Dec., '90} report a case of spasmodic torticollis, unsuccessfully treated by ligaturing the spinal accessory nerve with silver wire. This case had been previously reported¹¹²_{Feb., '90} as cured by large doses of gelsemium after other methods failed. Having relapsed, the wire ligature suggested by Mayo Collier was tried without benefit.

In discussing the question, Keen spoke of the necessity, in

many cases, of dividing more than the spinal accessory nerve, as a large number of muscles were sometimes involved in spasm, and he had even discussed with Horsley the propriety of excising the cortical centre for rotation of the head in cases that did not yield to milder means. In a case reported by himself and Dercum,⁹⁶ he had exsected part of the nerves supplying the posterior rotator muscles of the neck, with a considerable amount of improvement, though not cure. The steps of the operation are as follow:—

First Step.—The field of operation having been shaved and disinfected, make a transverse incision about half an inch below the level of the lobule of the ear, from the middle line of the neck posteriorly, or even slightly overlapping the middle. This incision should be two and one-half to three inches long.

Second Step.—Divide the trapezius transversely.

Third Step.—Dissect up to the trapezius and find the occipitalis major nerve as it emerges from the complexus and enters the trapezius. In the complexus is an intra-muscular aponeurosis. The nerve emerges from the complexus at a point between this aponeurosis and the middle line, usually about half an inch below the incision, but sometimes higher up, and then enters the trapezius. It is always a large nerve of the size of a stout piece of catgut, and is easily found if sought for at the right place.

Fourth Step.—Divide the complexus transversely at the level of the nerve. This division should be made by repeated small cuts, so as not to cut the nerve which is our guide, after which dissect the nerve still farther down from the anterior surface of the complexus, where it arises from the posterior division of the second cervical. Cut or, better, exsect a portion of the posterior division before the occipitalis major arises from it, so as to catch the filament to the inferior oblique muscle. This divides the *second cervical*.

Fifth Step.—Recognize the inferior oblique muscle by following the suboccipital nerve toward the spine. The nerve passes immediately below the border of the muscle.

Sixth Step.—Recognize the suboccipital triangle formed by the two oblique muscles and the rectus capitis posticus major. In this triangle lies the suboccipital, close to the occiput. It should be traced down to the spine itself, and be divided or, better, exsected. This divides the *first cervical*.

Seventh Step.—An inch lower down than the occipitalis major, and under the complexus, is the external branch of the posterior division of the third cervical to the splenius. When found, it is to be divided or exsected close to the bifurcation of the main trunk. This divides the *third cervical*.

A drainage-tube and horse-hairs are to be inserted, and as the patient lies on the back, although the wound is very deep, the condition is most favorable for good drainage. If desired, the posterior muscles can be united by buried sutures, independently of those in the skin. The after-treatment is the same as for ordinary operations.

Noble Smith,⁶ has done much the same operation with success.

At this same meeting Morris J. Lewis reported a case showing the importance of the muscles upon the back of the neck in this rotation of the head, inasmuch as both sterno-cleido-mastoid muscles had been removed, together with the spinal accessory nerves, and yet the lateral movement continued. At the November meeting of the Orthopædic Section of the New York Academy of Medicine, Reginald H. Sayre,¹ showed a patient wearing a modification of his father's plaster jacket and jury-mast for retaining the head in position after tenotomy of the sterno-mastoid. A few days before the operation a plaster-of-Paris corset is made as usual, which, when finished, is at once cut off. In the layers of the bandage is incorporated the lower part of the ordinary jury-mast, the top of which, instead of being of the usual shape, consists of a bar bent forward to come under the occiput, and provided with two arms, which encircle the head half-way. These arms are roughened on both sides. After the operation is completed and the dressings are applied, the plaster-of-Paris corset is put on and either fastened with a plaster-of-Paris bandage or with hooks and eyes, as in lateral-curvature corsets. A tight woolen foot-ball cap is pulled well over the head down to the eyebrows and nape of neck. This is covered with a few turns of plaster-of-Paris bandage. The head is then twisted to the desired position and the arms of the jury-mast securely fastened to the cap by a few more turns of plaster-of-Paris bandage, much like the head-rest of a photographer.

DUPUYTREN'S CONTRACTION.

William Anderson,⁶ believes that Dupuytren's contraction is due to a specific micro-organism which gains access to the subcutaneous tissue through accidental lesions of the epidermis, mostly effected by the finger-nails. He thinks the parts where the initial lesion usually is found point to injury by the nails, and regards the comparative immunity of the feet as due to the greater protection afforded them by shoes and stockings. Shattock has carried out, at this suggestion, a series of bacteriological researches which are still incomplete, but which, Anderson says, have not shown his views to be incorrect, though they do not prove them.

CLUB-FOOT.

In certain cases of club-foot where the foot remains inverted though the foot be placed on the ground, Ogston has performed osteotomy of the fibula and tibia just above the ankle-joint and rotated the foot outward. Grattan,² reports 5 cases treated in a similar way, except that the fracture of the bones was made by his osteoclast in two places,—one close to the ankle-joint, the other between the lower and middle third of the leg. After this the foot was twisted outward and secured in its new position by an iron splint. After ten days the splint was removed and the foot put in line with the patella. In all the cases of toeing which the junior associate editor has seen, the astragalo-tibial joint has been in the normal position and the deformity has been anterior to it, and hence he is of the opinion that the operation should be anterior; if, however, the ankle-joint be rotated in so that the fibula lies anterior to the tibia, the proposed operation would be very feasible. At the last International Medical Congress, Bradford, of Boston,²⁰⁰⁰ showed a twister for manipulating these old intractable feet into position, and during the past year the junior editor of this department has used it in 6 inveterate cases with great satisfaction. It consists of a steel lever two feet long and three-eighths of an inch square, attached to one extremity of which is a cross-bar. The other end of the lever is attached to a foot-plate, which has a bar passing over the top of the foot to hold it in position, while a hoop passes over the instep from the tip of the lever and exerts pressure on the projecting cuboid. In actual practice it has been found an admirable means of twisting some obstinate cases straight.

Von Büngner⁸⁸⁶ says that Volkman has successfully followed out Julius Wolff's suggestions, and treats old cases of talipes by rectification as far as possible at the time of sitting, and retains them in position by plaster-of-Paris bandages. After some weeks these are removed and the foot still further corrected, and so on until cured,—the weight of the body applied to the foot in the proper direction being used as the force to twist the bones of the foot into position.

L. Monnier¹⁵² gives an account of a child born with a "club thumb," the distal phalanx being everted at a right angle to the long axis of the thumb, and being retained in this position by the shortness of the external lateral ligament of the interphalangeal joint. The ligament was divided subcutaneously, the joint immediately put in the normal position, and kept so by a dressing. Later on, the child was fitted with an apparatus to prevent the joint from returning to its deformed position, which it had a tendency to do, and at the same time to allow the thumb some motion.

SPINA BIFIDA.

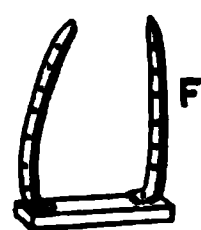
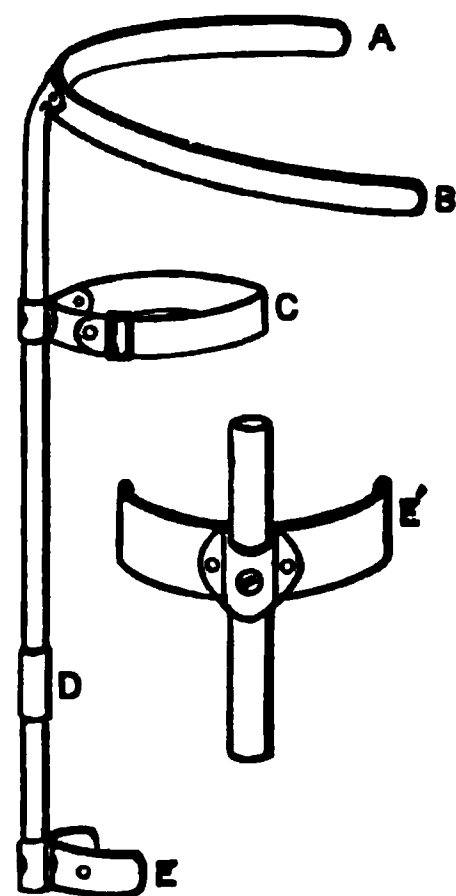
A. F. Jonas¹⁰⁶ reports a case of spina bifida successfully treated by excision of the sac. In this case the sac was found to contain almost all the cauda equina. The superfluous skin, together with the nerves, was cut away and the wound closed with silk sutures. Jonas thinks this case shows that the danger of removing the cauda equina in these cases has been overestimated. W. H. Lothrop⁹⁹ reports a case of spina bifida where the autopsy showed an opening at the centre of the occipital bone, oval in shape, three-eighths of an inch in its longest diameter.

HIP-JOINT DISEASE.

R. W. Lovett⁹⁹ describes a cheap hip-splint for hospital use, the cost of which, at the Children's Hospital, Boston, is \$2.50 to \$3.00. The splint is made of one-fourth-inch gas-pipe, or, in cases where it is very long, of three-eighth-inch pipe. The upper end of the pipe is forged out flat to be riveted to the pelvic band (A B), which consists of a flat steel band about an inch wide, shaped to fit the curve of the pelvis. Buckles are to be attached to this at suitable places, in front and behind, for the perineal bands, and at the ends of the arms to secure the splint in place by means

of a strap around the other side of the pelvis. The pelvic band is set upon the upright at an angle with the anterior arm lower than the posterior. The gas-pipe upright terminates below in a flat forged foot-piece. This foot-piece is forged out of common steel, with its upper end small enough to go inside the gas-pipe, which is cut off squarely. The whole is heated and welded together at a point four or five inches from the bottom of the foot-piece. The foot-piece is shod underneath with a thickness of sole-leather and pierced for the rivets to fasten two half-inch leather straps (F), by means of which traction is to be made. A coupling is inserted at D to provide for the lengthening of the splint as the child grows. It is more convenient to have two couplings in the upright, so that the length of the splint may be changed by the insertion of a piece of pipe of varying length between them. The semicircular arms C and E are forged out of flat malleable iron and fastened to the upright by a small screw, as shown in the detail drawing E'. Rivets at each end attach a strap and buckle to encircle and steady the leg.

The splint can be used either as a walking splint with a high shoe on the other foot, or as a traction splint pure and simple, by means of the use of crutches, not allowing the splint to touch the ground. Stout buckles with tongues should be attached to the lower ends of the adhesive-plaster leg-extension and the strap F buckled into them. This form of traction is, of course, inferior to the steadily and easily graduated pull which one obtains by a windlass or a ratchet extension, but it seems enough for all practical purposes in the hands of reasonably careful people, and it is hoped that the cheapness and simplicity of the splint may commend it in instances where simplicity and cheapness are essential. C. F. Stillman⁷⁷⁹ describes an adjustable bed-frame to be used in connection with his sector splint in hip disease. This is like the old-fashioned cuirass, except that it is divided transversely at each hip, and each segment provided with



LOVETT'S HIP-SPLINT.
(*Boston Med. and Surg. Jour.*)

a compound clamp (see figures), which admits of their being placed at any angle with the body part of the couch and with each other. A ball-and-socket joint may be used, but is not so efficacious.

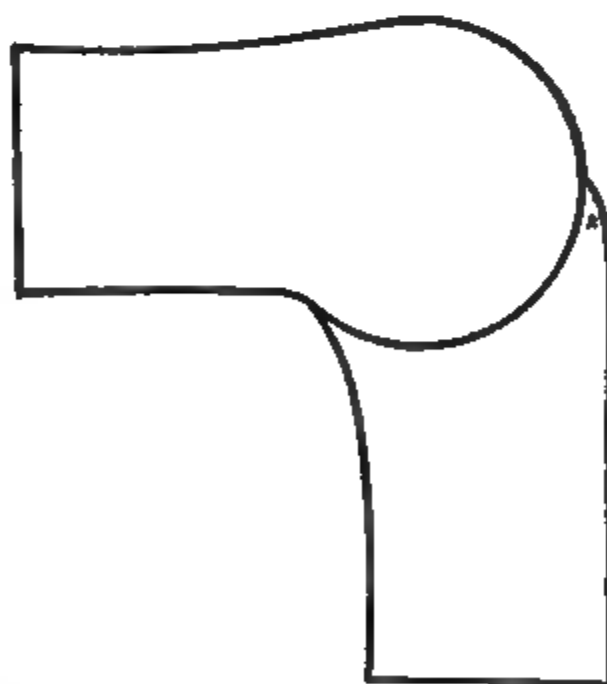
STILLMAN'S COMPOUND CLAMP FOR THE HIP.
(*North American Practitioner.*)

STILLMAN'S APPARATUS FOR THE TREATMENT OF THE HIP (COMPLETE).
(*North American Practitioner.*)

ANGULAR ANKYLOSIS OF KNEE.

In a paper read before the Congress of German Surgeons in Berlin, Helferich, of Greifswald, ²²⁶Vol. 161, p. 246 described a new method of correcting the deformity resulting from ankylosis of the knee-joint. He criticised the operation usually performed, viz., the removal of a wedge of bone, and pointed out that when the deformity is great a proportionately large wedge has to be excised. The result of removing a large wedge is a material shortening of the limb, the amount of this shortening depending on the size of the wedge. Another objection to this operation is that, where the patients are young and the deformity great, in removing the necessary wedge the centres of ossification are destroyed or removed, and thus development is prevented. A 13-year-old boy was brought to the author with the knee firmly ankylosed, the leg being flexed at a

right angle to the thigh. This deformity resulted from imperfect immobilization after a previous resection. Considering the age of the patient, the resection of a wedge was thought not permissible. The indications were fully met by free and open division of the tense fascia and tendons in the popliteal space and by the resection of a *small* wedge, which was sawn so as to be concave above and convex below. The result in this case was excellent. In spite of the previous resection, the shortening was only 3.5 centimetres ($1\frac{1}{4}$ inches). We give the operation in detail: A curved incision was made over the joint in front, and the periosteum and soft parts were reflected from the lower end of the femur and patella, which was fixed to the femur. The soft parts behind were protected by a periosteal elevator passed between them and the bone. By means of a finger-saw a thin wedge of bone was now sawn from the lower end



ANKYLOSIS OF KNEE-JOINT.
(Kansas City Medical Index.)

of the femur, the lines of section being curved so as to be concave above and convex below. The base of this wedge was about $2\frac{1}{2}$ centimetres ($\frac{9}{16}$ inch) thick; the apex was about $\frac{1}{4}$ centimetre ($\frac{1}{8}$ inch).

By this procedure an improved position was obtained, but it would have required the application of too much force to complete the rectification; so the patient was laid on his face and the tense soft parts of the popliteal space were divided as follows: Two longitudinal incisions were made, corresponding to the lateral margins of the popliteal space, and from there the fascia was divided transversely, as well as the tendons of the biceps, semimembranosus and semitendinosus. Gentle manipulations now sufficed to extend the knee. Fixation was easily secured by two sutures through the bones. The wound was sutured and dressed aseptically without drainage. A dorsal splint was applied and the limb suspended. The result was firm union in the new position, with a minimum of shortening.

The author speaks of the dangers of injuring the lower line of ossification of the femur in the young, and advises that, where one is doubtful as to the location of this, he should, with a chisel, remove a part of the surface of the femur, and so find it. He has found this procedure useful and harmless. As a result of experience gained in his earlier cases, Helferich thinks that where the tibia is ankylosed to the femur at a right angle it is unnecessary to remove any bone. He recommends that the bone be sawn through in a curve corresponding in position and course to the normal antero-posterior curve of the lower articular end of the femur, and then that the fascia and tendons, lying behind, be divided as previously explained. The result of such an operation is a straight limb without any shortening.

GENU VALGUM.

William Horrocks²_{on x} describes a splint for the treatment of genu valgum which consists of two parts, a thigh- and leg- piece, united by a rivet behind the knee. This allows lateral but not antero-posterior movement of the two parts. The thigh-piece consists of a hollow trough, which fits the back and sides of the thigh, reaching as high as the folds of the buttock behind, the perineal

fold on the inner side and the great trochanter on the outer side. Below, the thigh-piece is united with the leg-piece in the middle line, and prolonged as a flat piece, which lies against the back of the leg-piece. On the inner side the thigh-piece reaches

SPLINT FOR GENU VALGUM.
(*British Medical Journal.*)

below the prominent internal condyle, while the outer side is cut away so as to fit the muscular mass on the outer side of the thigh. The leg-piece consists of a trough, which fits the back and sides of the leg. It is united above with the thigh-piece; below, it fits



FIG. 1.—RUPTURE OF TENDO ACHILLIS.
(*Revue d'Orthopédie.*)

under the back part of the sole of the foot, with a hole behind for the heel. Across the front of the leg- and thigh- pieces two straps with buckles are fixed. To the end of the flat vertical bar a strap is attached.

The splint is applied by firmly fixing the leg- and thigh-

pieces on the child's limb in the faulty position, the flat bar prolonging downward, the thigh-piece then lying to the inner side of the leg-piece. The limb is straightened by bringing this vertical bar behind the leg-piece, and fixing it in this position by passing the strap around the leg to a button on the inner side of the leg-piece. The splint is made of thin iron or tin, and is suitably padded. Boots made broad at the heel are worn.

It is manufactured by Arnold, West Smithfield, London, England.

Poncet⁸⁵³ suggests that in rupture of the tendo Achillis, where

FIG. 2.

FIG. 3.

FIG. 4.

RUPTURE OF TENDO ACHILLIS.
(*Revue d'Orthopédie*)

the ends of the tendon cannot be brought in contact without producing equinus, the os calcis be sawed through perpendicularly so as to allow the posterior fragment with the tendo Achillis attached to be slipped up and nailed to the anterior fragment on a higher plane (Fig. 1), and, if this does not allow the ends of the tendon to come in contact, to cut the upper part of the tendon in a zigzag fashion on both edges to elongate it. (Fig. 2.)

In fracture of the patella, after passing the ligatures through both fragments, if they cannot be approximated, he chisels off the tuberosity of the tibia and moves it upward with its patella-tendon attached, and anchors it just below the edge of the knee-joint. (Figs. 3 and 4.) A similar proceeding is advocated in rupture of the triceps muscle.

INGROWN TOE-NAIL.

Puerckhauer ¹⁶¹_{7th} recommends a novel, simple, and at the same time competent treatment for ingrown toe-nail. A 40-per-cent. solution of potassa is applied warm to the portion of the nail to be removed. After a few seconds the uppermost layer of the nail will be so soft that it can be scraped off with a piece of sharp-edged glass; the next layer is then moistened with the same solution and scraped off; this must be repeated until the remaining portion is as a thin sheet of paper, when it is seized with a pincette and lifted from the underlying soft parts and severed. The operation does not require more than half an hour's time, is painless and bloodless, while the patient is delivered from his suffering without being disabled even for an hour.

RACHITIS.

Stefano Mircoli, ⁵⁰⁵_{Aug. 16} in a previous series of bacteriological researches, has demonstrated, in certain nervous diseases (sciatica, chorea, hydrocephalus), the presence of well-known and typical pyogenic microbes (staphylococcus and streptococcus) in the nervous organs of patients.

In continuing his researches on children dying of hydrocephalus and rickets, he has not only confirmed the preceding results, but, in examining the bones which were most affected by the rachitic processes (nodular thickening on the ends of the ribs, softening of the cranial bones), he obtained pure cultures of the pyogenic microbes. The streptococcus was found in these last researches, but only very rarely. The etiology of rachitis is therefore parasitic, according to the author, who will conclude his present experiments at an early date and present the results obtained.

He thinks, from the data now in hand, that the pyogenic microbes generally produce local phenomena in adults; in children

not yet habituated to these micro-organisms the infection becomes general and forms local foci in organs possessing great formative or functional activity, such as the osseous and nervous systems.

AMPUTATIONS, EXCISIONS, AND PLASTIC SURGERY; DISEASES OF BONES AND JOINTS.

By P. S. CONNER, M.D.,
AND
LEONARD FREEMAN, M.D.,
CINCINNATI.

AMPUTATIONS.

Von Esen³⁰¹_{B.M.H.1.2} has published the results of the major amputations and disarticulations made at the Dorpat Clinic, between the years 1878 and 1888, since the adoption of antiseptic methods. One hundred and sixty-two operations are reported, with a mortality of 17.9 per cent. Counting from 1884, the mortality is but 12 per cent. Previous to the antiseptic period the mortality was at least 35 per cent. At Tübingen, from 1877 to 1882, the mortality in 149 cases was 9.4 per cent.; in Socin's 139 cases, from 1871 to 1880, 11.5 per cent.; in Fischer's 107 cases, from 1877 to 1884, 13 per cent.; in Volkmann's 351 cases, from 1874 to 1880, 14.8 per cent., and in Schede's 63 cases, 1880, 33.3 per cent. The author divides his 162 cases into complicated and uncomplicated, the latter showing a mortality of but 5.93 per cent. Pathological amputations were less fatal than those made for traumatism, but 6 of the former out of 102 having died previous to 1883, and in 47 such amputations made subsequent to that date none proved fatal. In complicated cases—those in which septic infection had already taken place—the mortality was much higher,—42.8 per cent. The Dorpat statistics support the old view regarding the increase of danger in amputating as the trunk is approached. Erysipelas, lymphangitis, neuroses, conicity of the stump, secondary hæmorrhage, and neuralgia are in reality rare, and occur especially in previously infected cases. More or less sloughing of the flaps was noted in 24.1 per cent. of non-complicated cases (28.8 per cent. of pathological amputations and 40 per cent. of traumatic amputations). More accurately, it occurred in

(H-1)

30.3 per cent. of leg amputations and in 30.9 per cent. of thigh amputations. The difficulty is attributed to: (1) defective vitality and bruising of the flaps in traumatic amputations, which are often made too near the seat of injury; (2) strangulation of tissue by sutures; (3) too severe or too long-continued pressure, which is often caused by the first dressing. These sloughs are of no particular gravity, except that they prevent speedy union. Out of 132 recoveries in the Dorpat Clinic, 56 per cent. united by first intention and 44 per cent. suppurated, the latter being mostly cases which were previously infected.

It is noted that traumatic amputations are less liable to heal by first intention than pathological, and that amputations of the inferior extremities unite less frequently than those of the superior. In non-complicated cases the age and general condition do not exert a marked influence, but if an infection complication exist the presence of senile debility, or of some diathesis, exerts a marked influence upon the prognosis by rendering the tissues more vulnerable to the infective organisms. Out of 222 simple, traumatic, and pathological amputations, made in the Heidelberg Surgical Clinic from 1877 to 1887, and reported by Schrade,⁷⁶¹ 200 healed by first intention. The mortality was 2.7 per cent.

Neudörfer,⁸⁴ proposes a new method for the amputation of extremities. The older methods all have the following disadvantages: (1) irregular division of the soft parts; (2) the bone is usually divided higher than is really necessary; (3) troublesome cicatrices often result; (4) conical stumps may be formed; (5) the saw does unnecessary injury to the bone; (6) periosteal flaps, being deprived of nutrition, do not reproduce bone; (7) a special set of cumbersome instruments is required. In the amputation of an extremity in which but one bone is to be divided the technique of the new operation is as follows: Determine the point at which the bone is to be divided. With a sharp-pointed resection-knife, make an incision from this point downward in the long axis of the limb, extending through the soft parts and periosteum. The incision, which should be upon the lateral or anterior surface of the limb, to avoid the larger nerves and vessels, must be about six centimetres in length for the arm and twelve centimetres for the thigh. With a raspatorium the periosteum is thoroughly loosened from the bone in the line of incision, and the bone divided with a chisel, as in

an osteotomy. The lower fragment is then luxated through the slit in the periosteum, which membrane is at the same time carefully stripped from the bone. The soft parts are now divided in one plane with an ordinary scalpel or even a pair of large scissors, the intimate relation of the tissues remaining entirely undisturbed. Ligatures are then applied to the vessels, the edges of the periosteum stitched together, both longitudinally and transversely, buried sutures employed, where desirable, to unite the soft parts, and the skin brought together with a continuous suture. The author speaks strongly in favor of the chisel as doing less damage to the bone than the saw, and claims to have demonstrated this point by direct experiment.

The advantages of the method are thus formulated: (1) the soft parts remain in their normal relations to each other, and hence (2) cannot retract, thus forming a soft cushion for the bone; (3) the vessels may be controlled by the thumb and finger in the flap, and exact union of the tissues renders secondary hæmorrhage nearly impossible; (4) no troublesome cicatrices result; (5) the periosteum retains all its nutritive and osteogenetic properties; (6) conical stumps are never produced; (7) skilled assistants are not necessary; (8) few special instruments are required; (9) drainage is unnecessary; (10) this is the only really subperiosteal amputation.

Amputations of parts having two bones are made in essentially the same manner as where but one bone is present, except that two incisions are required. The author also applies his method to amputation through joints, giving the technique in each case. A number of atypical operations are also described, the necessity for which may arise from peculiarities of injury or disease. The objections to the method may be as follow. 1. It is new, has no statistics, and lacks the support of prominent men. 2. In the amputations of extremities containing two bones the operation seems more complicated than it really is; and it certainly requires somewhat more time than the usual methods. 3. The method must first be practiced on the cadaver. Thickened periosteum is easily removed, but normal periosteum is elevated with considerable difficulty. From the side of the patient, however, there are no disadvantages to the method.

Manley¹³⁸ believes that primary amputation in civil life is seldom or never necessary, except when the mangled parts are united

only by shreds of tissue or pieces of tendons, when these should be simply divided.

The treatment of senile gangrene of the lower extremity, especially in diabetics, as carried out in Küster's clinic, is discussed by Heidenhain,⁶⁰ who calls attention to the following conclusions, based on an experience of 30 cases: As long as the gangrene is confined to one or two toes the line of demarcation should be awaited, and the dead tissues allowed to separate of themselves. Removal of the gangrenous portion with forceps and scissors may lead to gangrene of the parts above, although the line of demarcation has been fully established. As soon, however, as the gangrene attacks the sole or the dorsum of the foot, an amputation of the thigh should be made as close above the condyles as possible. Amputation below the knee is nearly always followed by gangrene of the flaps. In 11 cases of diabetic gangrene, 6 were saved by thigh amputations. Two of the fatal cases had large quantities of sugar in the urine (8 per cent. and 5 per cent.), while the remaining 2 showed much albumen in addition to sugar. One patient with 5 per cent. of sugar, which disappeared after the operation, recovered, as did 1 with 2 per cent. of sugar in addition to some albumen. Out of 14 cases of simple gangrene, on which amputations were made, 9 recovered. In 2 cases, in which leg amputations were resorted to, 1 died of gangrene of the flaps and 1 of sepsis.

Camus²⁴³_{Oct.} reports a case of gangrene of the leg consecutive to typhoid fever in which an amputation of the thigh was followed by recovery.

Wyeth,⁶¹_{Feb. 7} after describing in detail his skewer method of amputation at the hip-joint, says that serious shock may sometimes be avoided by performing this operation in two sittings. The amputation may be completed, with the exception of removing the head of the femur from the acetabulum, and the wound closed. After healing has taken place, and the patient is well on the road to recovery, the head of the bone may be removed by an external lateral incision. Wyeth also uses his bloodless skewer method in amputation at the shoulder-joint: one needle is made to transfix the anterior axillary fold, away from the vessels and nerves, taking firm hold in the tendon of the pectoralis major; the other pierces the deltoid just below the acromion process, and is pointed back-

ward. The arm having been emptied of blood, the rubber tube is tightly wound around the shoulder, above the needles. A circular flap is made, and rolled back to within three inches of the acromion, at which point the muscles and bone are divided and the vessels all secured. The tourniquet is removed, and the remaining portion of the humerus enucleated.

Truax¹⁰²_{June} insists that "surgeons should come to a full understanding of the relation between the stumps remaining after amputation and the appliances likely to be worn upon them," and emphasizes the necessity of "selecting that point for the operation that will afford the greatest possible use of the stump to the patient, even if in so doing he sacrifice considerable bone and tissue that might under former methods have been permitted to remain. In amputation of the hip and middle and upper third of the femur every inch of the bone that can properly be covered should be saved. Teale's amputation is condemned on account of the lateral scars upon which pressure must be made by the artificial limb." Carden's and Gritti's operations give excellent stumps from the instrument-maker's point of view. "Judged from a mechanical stand-point, the ideal knee-operation and point of selection would be *three inches above the joint*." The writer advises "the complete abandonment of every tarsal and tibio-tarsal amputation," the least objectionable of these operations, however, being Lignerolle's. He summarizes: "Avoid amputation within three inches of the knee-joint. Do not amputate between the metatarsal bones and the junction of the lower and middle thirds of the tibia. At all other points save all you can."

Clinton¹_{Mar. 7} claims that slow-moving trains do much less damage than those moving at a higher rate of speed; hence, when limbs are crushed by the former, amputation may be made closer to the apparent seat of injury.

Allis²³³_{Aug.} concludes that amputation of a limb for a railroad crush should not be made for at least twelve hours after the accident to avoid all possibility of shock, the injured part being in the meantime treated antiseptically. Rhodes¹⁴⁷_{Mar.} amputated the forearm at the wrist under the influence of cocaine, very little pain being experienced. The considerable shock which existed at the time of the operation disappeared shortly after the anæsthetic had been injected. No tourniquet was used. Cowan¹⁰¹_{Sept.} amputated

a leg under cocaine anæsthesia without causing the slightest pain. The left arm was removed by Rafin²¹¹ for elephantiasis, with excellent result.

Shaw⁹ mentions a case in which an old amputation of the thigh (six years) was associated with atrophy of the cortex of the brain in the region of the corresponding leg-centre. Toppin⁵ describes a curious phenomenon, consisting in the spontaneous amputation of the small toe, in Africans. The process begins in a crack, which appears on the under and inner surface of the toe, and gradually deepening and extending until amputation of the member results. Such cracks often appear about the toes of Europeans, especially soldiers, but they never become so extensive as they do in Africans.

Wyeth¹ reports a successful amputation for sarcoma of the left upper extremity, together with the outer half of the pectoralis major, the pectoralis minor, subclavius, all the muscles of the scapula, a portion of the serratus magnus, and the entire clavicle and scapula. (See illustration.) In the article describing the procedure is given a list of opera-

AMPUTATION OF LEFT UPPER EXTREMITY.
(*New York Medical Journal.*)

tions, 4 in number, in which the arm, scapula, and clavicle were removed simultaneously; another list, comprising 40 cases, in which the arm and scapula and a part only of the clavicle were simultaneously taken away; and a third list, of 5 operations, belonging either to the first or second category.

Hornbogen²³¹ instead of using digital compression, the Es-march constrictor, or other of the usual methods of controlling hæmorrhage in amputation at the shoulder-joint, employs Billroth's

forceps, applied at right angles to the long axis of the limb. The method seems to have originated with Fenger. Hardy,¹¹²_{May} in order to prevent hæmorrhage in an amputation at the hip-joint, made direct compression of the aorta after a preliminary laparotomy.

Gaston²⁷¹_{Dec., '90} amputated at the hip-joint, by the skewer method, for a cystic sarcoma of the thigh, which, after the removal of two gallons of dark-brown fluid, weighed 73 pounds. Death occurred on the twenty-sixth day after the operation. Sourier (Herrgott¹⁸⁴_{Nov. 16, '90}) has gathered 56 cases of subastragaloid amputation, and maintains that this amputation, when practiced according to the modified method of Jules Roux, is to be preferred to the operations of Chopart, Syme, or Pirogoff.

EXCISIONS.

The controversy as to the comparative merits of arthrectomy and resection of joints is still going on, although by far the greater weight of opinion seems to be in favor of resection. Richelot⁸_{Dec. 3, '90} is in favor of arthrectomy in cases in which there is no disease of the bones. Lucas-Championnière, however, maintains that resection is the more satisfactory operation, and that the gait in walking is just as good following resection as arthrectomy. In deciding between these two operations, Verneuil calls attention to the fact that white-swelling frequently recovers without any operative interference whatever. Quenu considers it impossible to tell, previous to opening the joint, whether the bones are diseased or not, and upon this point rests the choice of operations. He asserts that in adults the bones are, as a rule, affected, and they are always affected in children. Marchand, however, maintains that in adults they are frequently sound, while Routier supports the views of Quenu.

Von Bergmann²¹_{Mar. 10} states that conservative treatment may be continued as long as fever-signs of further involvement of the joint, pain, or general disturbances calculated to reduce the strength of the patient, are not present. Early resection should be resorted to only when conservative treatment is out of the question or has failed. The shoulder-, elbow-, and hip-joints offer the best prognosis from early resections; if there is no improvement after conservative treatment for eight to ten days a resection should be made. Atypical resections are the less extensive and more rational operations. When the disease is more especially synovial in its mani-

festations, it may be perhaps successfully treated by iodoform injections, especially when the knee, hand, or foot are concerned. In shoulder and elbow a movable joint is to be desired, and in hip and knee ankylosis is necessary. An excision of the shoulder- and elbow- joints of the same arm, for traumatism, was made by Malloch,⁸⁹ in a boy of 12, a useful arm being obtained.

Arthrodesis.—Defontaine¹⁰⁰ calls attention to the fact that Ramally has collected 68 operations, in all of which the results were favorable. Peterson⁸⁴ emphasizes the fact that, in removing the joint-surfaces, the epiphyseal lines must not be too closely approached, especially in the young; and that the bones after resection must be accurately approximated, and securely held in this position, which is best accomplished by means of long, nickle-plated, steel nails. More than one joint may be operated on at the same time with safety.

SPECIAL EXCISIONS.

Hip.—Sack⁸⁰¹ describes the changes occurring in the hip-joint following resection, with a minute description of a case, operated on four years previously by Czerny, in which the joint was found in an intermediate condition between neo-arthritis and pseudarthrosis.

Knee.—Neugebauer⁸⁰¹ reports 101 resections of the knee-joint made by Lücke during the last eight years. Seventy-one were total resections and 30 partial. In the total resections the epiphyseal cartilage was avoided as far as possible, and the anterior edge of the femur cut convexly, in order to avoid subsequent angular contraction at the joint. Whenever possible, the patient was allowed to walk about with the extremity encased in a water-glass dressing immediately after ankylosis had been obtained. The results, when the patients left the hospital, are thus tabulated:—

| RESULTS. | Total Resection. | Partial Resection. | Totals. |
|------------------------|------------------|--------------------|-------------------|
| Completely healed. . . | 48=60 per cent. | 21=70 per cent. | 64=63.3 per cent. |
| Incompletely healed. . | 13=18 " | 5=17 " | 18=17.8 " |
| Secondary amputation . | 5=7 " | 4=18 " | 9=8.9 " |
| Died in hospital . . . | 10=15 " | | 10=15.0 " |

The age varied from 1 to 50 years, the majority being between 6 and 15. The causes of death were mostly chronic affections of

the lungs, although 1 died of erysipelas, 1 of sepsis, 2 of tetanus, and 1 of tubercular meningitis. The ultimate result was obtained in 69 cases, 8 of which died of tuberculosis, 2 retained fistulæ, and 2 had local relapses. The ability to walk was good in 47 cases, slight in 11. Angular position developed 32 times out of 61 cases, in partial as well as total resections; but was slight in all but 4. Lengthening of the limb was observed in but 6 cases,—in 3 before operation and in 3 afterward.

In only 4 cases was shortening absent after the operation, and in only 1 of these was the same length of limb retained for several years. In 2 cases (partial and total resection) the limbs finally grew to be the same length, and in 3 only one of the two epiphyseal lines was retained. Partial resections were found to lead to much less shortening than total resections. According to Dollinger, however, ultimate shortening of the limb is the rule, even where no operation is made. The author is in favor of partial atypical operations.

Boeckel ³_{Apr. 12} has made 140 resections of the knee-joint, with 131 more or less complete recoveries and but 9 deaths,—a mortality of 6.4 per cent. In 61 operations made within the last three years, there were 50 complete recoveries without fistulæ, 6 with fistulæ, 1 secondary amputation, 1 case of pseudarthrosis, and 3 deaths. Age is not a contra-indication, Boeckel having made 23 resections in patients ranging from 40 to 82 years, and only twice was subsequent amputation found necessary. He uses no osseous sutures nor arterial ligatures, and considers drainage unnecessary.

Zoege-Manteuffel ³⁰¹_{B. 29, H. 1, 2} reviews 55 resections of the knee-joint for tuberculosis made in the Dorpat Clinic between 1878 and 1888. The Esmarch tourniquet was not employed. The Textor incision was used, the bones united by silk sutures, and the extremity encased in plaster for eight days. At the end of sixty-five days, on an average, the knee was put up in a felt-water-glass dressing and the patient sent home. Four patients were under 15 years of age, 17 from 15 to 19 years, 15 from 20 to 24 years, 16 from 25 to 30 years, and 3 still older. Union by first intention was obtained in 39 cases. Eleven per cent. of the cases died,—1 from carbolic-acid poisoning, 3 from general tuberculosis, 1 from fat emboli in the lungs, and 1 from unknown causes. Subsequent amputation was necessary in 2 cases; 47 cases recovered from the operation, but

later on 2 of these developed general tuberculosis and 6 suffered local relapses of the disease. Sixteen cases were found to be still well at the end of two to eight years, and 6 at the end of one to one and one-half years. All the cases, including those with local relapses, obtained good use of their limbs, a crutch being necessary only under the most adverse circumstances. The author considers it unnecessary to attempt the establishment of a movable joint, except when both knees are involved.

Christovitch⁶⁷_{Apr. 16} speaks strongly in favor of resection of the knee-joint for tuberculosis. He places the mortality, according to recent statistics, at 3 per cent. The operation is in place at any age,—even 60 or 70 years. Resection is to be preferred to arthrectomy, synovectomy, or osteo-arthrotomy, as these often cause only a false ankylosis, while resection always gives a firm joint. Resection of a joint, when the epiphyseal cartilages are not interfered with, never causes diminution of the growth of the limb; in fact, increased growth may occur from irritation. Defective growth, when it occurs, is due to the disease itself; hence, the limb should always be subjected to a careful examination, with this point in view, before operating. An ideal resection is one which heals without drainage and under a single dressing. The operation should be made early, to prevent atrophy of the limb, degeneration of the joint-structures, general infection, etc.

Kirmisson³⁰_{Dec. 10, '90} holds that partial resections of the knee are often indicated in tubercular disease of that joint, while Lucas-Championnière contends that total resections should be preferred, where it is possible to carry them out, as one can never be certain that lesions are not concealed beneath the articular surfaces of the bones. He considers that a certain amount of shortening—three to six centimetres—is necessary in order to obtain the best gait with an ankylosed joint. With the latter point, however, Richelot does not agree, although he greatly prefers resection to arthrectomy. Mynter¹⁷⁰_{Aug.} and Richelot¹⁷_{Dec. 7, '90} have published papers on arthrectomy and resection of the knee-joint.

Foot.—Extensive atypical resections of the foot are discussed by Isler,³⁰¹_{B. 21, p. 211} who strongly supports the views of Kapeller. Sixteen new cases are reported in detail, the ages of the patients varying from 8 to 65 years. The time of their stay in the hospital was from sixteen to fifty-one weeks. The number of the totally and par-

tially resected bones varied from three to ten, and the number of operations from one to five. None of the cases died as a direct result of the operation. The wounds of 10 were completely healed when they left the hospital, while the remainder showed small fistulæ. The results may be characterized as "very good" in 4 cases (8, 17, 28, and 42 years of age, respectively), in which the patients could walk without support as well as if the foot were sound; as "good" in 6 cases (19, 22, 24, 30, 32, and 46 years of age), in which a limp existed, no complicated movements could be made, and in which a cane was required during long walks; as "fair" in 4 cases (16, 19, and 38 years of age), in which the patients limped markedly, and required crutches; and as "bad" in 2 cases (43 and 65 years of age), in which the patients were utterly unable to walk at all. Most of the operations were made through longitudinal incisions along the outer and inner borders of the foot, to which cross-incisions were added if required. The wounds were stuffed with 10-per-cent. iodoform gauze, in order to combat the tubercular infection. The statistics of 145 operations collected by Kapeller show a mortality of 10.3 per cent., while the mortality of amputation above the ankle is 14 per cent., according to Schede. In individuals under 25 years of age the mortality is much less than in older patients, and the functional results are better. The results were "very good" in 40.8 per cent., "good" in 26.8 per cent., "fair" in 7.6 per cent., unknown in 8.3 per cent., and "bad" in 6.2 per cent. In 9 cases talus and calcaneus were both removed, with "very good" results in 4. In 2 cases (Conner and Kapeller) only the phalanges and parts of the talus and calcaneus were left, and yet very satisfactory results were obtained. Extensive resections afford much superior results to the Mikulicz operation, which should be used only when there is extensive loss of tissue in the region of the heel. Bruns¹³_{Sept.} has modified König's method in arthrectomy of the tibio-tarsal articulation by adding one or two longitudinal incisions between the tendo-Achillis and the malleoli. He says that the removal of tubercular products is in this way much simplified.

Kummer has tabulated 54 cases in which the Wladimiroff-Mikulicz operation was done, between the years of 1871 and 1889, in patients at all ages from 9 to 52. In 38 cases the indication was caries; in 9, wounds; in 2, ulcers of the heel; in 3, sarcomata;

in 1, shortening of the limb; and in 1 the reason for interfering was not given. In 17 cases out of 27 in which note was made on the point, solid union was obtained; in 10 it was not. Kummer believes that, while indications exist for the procedure, the functional result is inferior to that which follows resections of the tarsus, one objection urged being the digitigrade condition of the foot. In 40 resections, according to Wladimiroff-Mikulicz, relapses occurred in 22.5 per cent. The ultimate results are better in ordinary tarsal resection. The Wladimiroff-Mikulicz operation should be resorted to only when the skin has been destroyed in such a manner that a tarsal resection cannot be made. Kummer concludes that, as far as walking is concerned, resection of the posterior tarsus, by the ordinary method, or by the operation of Wladimiroff-Mikulicz, according to circumstances, is superior to the operation of Pirogoff-Le Fort or that of Syme-Ollier. The last two, however, offer the advantage of amputations in general,—rapid recovery. Ollier³⁶_{July} regards the principal indication for the Wladimiroff-Mikulicz operation to be destruction of the skin of the heel, but thinks that it might take the place of tarsotomy in adults when the period of bone formation is passed. He prefers either posterior tarsotomy or amputation according to the modified Syme method. Voituriez²²⁰_{July} confines the Wladimiroff-Mikulicz operation to osseous affections of the calcaneum and astragalus, whether they be tuberculosis, osteitis, or osteosarcoma.

Elbow.—The ultimate result of 16 resections of the elbow-joint, made at the Boston General Hospital during the ten years immediately preceding 1887, are reported by Scudder.⁹⁹_{Apr. 18} Elaborate tables are given. Out of 4 cases resected for ankylosis, in 2 the ankylosis returned. In 4 cases operated on for severe compound fractures, 1 died of septicæmia, 1 obtained a very useful, and 2 a fairly useful arm. In 8 cases in which resection was done for caries of the joint, 1 died of general tuberculosis, 4 obtained very useful and 2 fairly useful joints, and in 1 case the arm is characterized as useful. Zatti,³³⁶_{June 18} in order to obtain a solid right-angular ankylosis of the elbow-joint after resection, saws the extremities of the bones obliquely, at an angle of 45 degrees, as in the illustration. Phocas,³_{Sept. 9} in an exhaustive article on resection of the elbow in children, says that, contrary to what may be said of the knee-joint, fear of injury to the epiphyseal line should not

be considered in reference to resection of the elbow, because this line is but slightly concerned in the longitudinal bone-growth. He thinks that the operation in children is deserving of greater attention than it at present receives.

Gritti,³³⁶ proposes a new method for resection of the wrist-joint, by means of which the carpus, the ends of the radius and ulna, as well as the ends of the four metatarsal bones, may be removed in one piece without opening the several joints, thus leaving the trapezium and metacarpal bone of the thumb. If these latter are diseased amputation is preferable. He uses two longi-



RESECTION OF ELBOW-JOINT.
(*Centralblatt für Chirurgie.*)

HOFFMANN'S METHOD OF WRIST-JOINT
RESECTION.
(*Deutsche medicinische Wochenschrift.*)

tudinal incisions, one radial and one ulnar, connected by a transverse incision across the middle of the wrist. A useful thumb is left. Three cases are reported. Hoffmann,⁶⁸ independently of Gritti, has suggested an almost identical operation (see illustration).

Sternum.—Mynter⁹⁶ partially resected the sternum for melanoma. No relapse had occurred at the end of two months. All danger of opening the pleural or pericardial cavities, as happened in a case operated on by König, was avoided by first trephining the sternum and then removing the remainder of the bone with bone-forceps.

Scapula.—Two successful cases of removal of the entire scapula, with its muscles, for sarcomata, are reported by Putti.⁵⁸⁹ In both cases a fairly useful new joint was obtained by placing the head of the humerus beneath the acromial end of the clavicle and suturing the remains of the capsule to the portions of the excised muscles which were left behind. The deltoid was carefully sutured over the new joint. Ollier,²¹¹ made a successful total subperiosteal resection of the scapula for tuberculosis, the functional result being quite satisfactory. A complete regeneration of the scapula after its removal for acute osteomyelitis occurred in one of Jaboulay's cases.²¹¹

Humerus.—Lancial²²⁰ removed the entire diaphysis of the right humerus for an acute osteomyelitis. The bone was completely regenerated and satisfactory function restored.

Forearm.—Guermonprez¹⁰⁰ advises resection of a portion of both bones of the forearm in extensive injuries to the soft parts which threaten to result in serious cicatricial contraction. He makes the resection in such a manner that the bones remain mortised one into the other, and fastens the silver-wire sutures, which he employs in a peculiar manner. Two cases are reported, with satisfactory results.

DISEASES OF BONE.

Tuberculosis.—Tuberculin, as a diagnostic and remedial agent in surgical tuberculosis, rose rapidly into marked prominence during the early part of the past year; but its decline and fall were fully as sudden as its phenomenal rise, and it has now almost entirely disappeared from view, its use being continued by but comparatively few surgeons. A discussion of the merits and demerits of Koch's discovery belong rather to the medical section of the ANNUAL than to the surgical. It may be mentioned, however, that it is quite generally accepted that any curative effect exercised by tuberculin in surgical affections is best obtained in conjunction with operative treatment; and, in general, the most that can be hoped for is a temporary arrest of the disease. Some of the objections to the use of tuberculin are mentioned by Watson Cheyne²: (1) the resulting local inflammation may lead to serious complications, especially when internal organs are affected, and it seems, in some instances, to predispose tissues to fresh infection; (2) the fever and general symptoms following its use may

be severe and even alarming; (3) the remedy is dangerous when septic infection is already present, the fluids poured out offering a culture medium to the pyogenic germs; (4) tuberculin not only does not produce immunity, but actually, in some cases, apparently predisposes the body to tubercular infection. Other prominent surgeons state that the "characteristic reaction" may be obtained in the presence of other diseases when tuberculosis is absent; and Virchow's claim that generalization of the tubercular process was sometimes produced seems to have been confirmed by further observation. Klebs,⁶⁹ however, has very recently isolated an albumose from crude tuberculin, which he calls tuberculocedin, and which, he claims, acts specifically upon the tubercle bacillus itself, without the production of fever or tissue-necrosis. The results of his experiments have so far been encouraging.

Watson Cheyne²_{Nov. 20 to Dec. 20, '90, Apr. 1} has published a series of instructive lectures on tubercular diseases of bones and joints, in which he confines himself, in the main, to the pathological side of the question. He divides tubercular tissue into two forms,—tubercle and "tubercular infiltration"; the latter being tissue infiltrated with tubercular elements, but containing no definite tubercles.

The lesions of synovial membranes are divided into (1) various forms of diffuse thickening; (2) limited thickening; (3) acute miliary tuberculosis; (4) tubercular hydrops or tuberculous empyema. If the disease is secondary in the synovium, it is at first confined to its superficial layer, the deeper layers showing only a non-tubercular fibrous thickening; hence, the entire thickness of the synovium need not be removed. If the disease, however, originated in the synovial membrane, the deeper as well as the superficial layers are infiltrated with tubercles, and must be removed completely.

Bone tuberculosis is divided into (1) miliary tuberculosis; (2) soft caseating deposits; (3) tubercular deposits with sclerosis of bone and necrosis; (4) superficial tubercular disease (caries); (5) caries sicca; (6) diffuse condensation; (7) diffuse softening and the formation of so-called "red marrow"; and (8) tubercular periostitis and osteomyelitis. We must bear in mind the inflammatory processes which accompany these lesions, and which play an important part. The fact is emphasized that, although the primary cause of the whole trouble in a joint is the tubercu-

lous disease, the main changes which occur are brought about by chronic inflammation set up by the tuberculous growth, and which is often very extensive. He is careful, also, not to underestimate the effects of pressure. Miliary tuberculosis of single bones, apart from general miliary tuberculosis or large tubercular deposits, is denied, although it has been described by others.

As regards the origin of tubercular disease in cartilage, nothing definite can be said, except that it certainly does not originate in either hyaline or articular cartilage. As regards fibrous cartilage, the question is still open. "Of great clinical importance (in the caries of bone) are the following facts, namely, the slight depth to which the actual tubercular disease extends,—seldom more than a quarter of an inch,—the tendency to sclerosis immediately beneath it, and the occurrence of rarefying osteitis at some distance away, and often in patches without any tubercular growth. It is very curious to note, in many cases, that a layer of comparatively normal cancelli separates the carious part from that where the rarefying osteitis is most marked; but of this fact I am unable to offer any rational explanation at present." It must be borne in mind, in treatment, that the whole wall of a tubercular abscess is infected and infective. The writer recommends dissecting out the abscess as if it were a cyst, when this is possible; and, if it cannot be dissected out, it should be opened, the wall pulled out as far as practicable, and the remainder destroyed by some strong antiseptic, such as undiluted carbolic acid. He believes, after careful investigation, "that the apparently small number of tubercle bacilli in these local tubercloses is often mainly due to the fact that they are growing slowly and with difficulty, and that their staining reaction differs at different periods of their existence. In sections of tuberculous synovial membrane stained by Ehrlich's method (bacilli red, tissues blue), I have not uncommonly found that, while a few red-stained bacilli were present, there were also some which were blue, and I have no doubt whatever that these are really tubercle bacilli." Hence "our present methods of staining do not allow us to draw conclusions as to the number of bacilli present."

Three excellent papers on tubercular disease have appeared,—by Primrose, McKenzie, and Peters.²⁰³¹

Tuberculosis of Foot.—The treatment of tubercular osteoarthritis of the foot is extensively discussed by Poisson.¹²⁷ In
Dec. 12, '90

tibio-tarsal white-swelling, before noticeable suppuration has occurred, immobilization and compression should be tried, aided, perhaps, by revulsives. Even when pus is present and fistulæ, especially in the young, a certain number of cases recover under this treatment. If, in spite of rest and compression, pus appears, but does not point, the treatment should be continued. If, however, pointing occurs, aseptic incision should be practiced, and the opening protected by an antiseptic dressing. Jalaguier reports 13 cases of arthrectomy, with 10 recoveries without fistulæ, 2 recoveries with fistulæ, and 1 subsequent amputation. Redard reports 5 cases with 5 complete recoveries. The conditions where success may, perhaps, be obtained by the simpler operations are: (1) the patient must be young; (2) the osseous lesion must be limited; (3) these operations may be practiced in old cases, in order to avoid an amputation or an extensive tarsectomy, but at the expense of the great risk of general infection and failure; (4) the patient must be under favorable hygienic conditions. In far-advanced cases König's operation answers a good purpose; but in milder cases it is best to remove the astragalus, as advocated by Ollier, thus exposing every portion of the articulation. Typical resections, having incisions which do not thoroughly expose the tarsus, are to be rejected. The best methods are those of Vogt, Reverdin, Zesas, and Girard, which all attack the articulation from the outside. They must all, however, be considered as a mere extension of Ollier's method of removal of the astragalus, and they are often responsible for the removal of more than is absolutely necessary. The indications for the Wladimiroff-Mikulicz operation should be very limited indeed; children do not usually require such extensive interference, and in adults amputation is generally preferable. Amputation should be performed in children only when all else has failed, except when the disease is very extensive or when the general condition requires very radical interference at once. In adults, if the disease is at all great, an amputation should be made.

Kummer¹⁸⁹⁷_{Sept. 90} reports 7 cases of fungous osteo-arthritis of the tarsus. He believes that better functional results are obtained by posterior tarsectomies than by amputations above the ankle.

Gross, of Nancy,¹⁹⁰¹_{Jan.} strongly recommends total resection of the tarsus, when necessary, and reports a successful case.

Phocas¹¹⁸_{Mar.} discusses at some length multiple localized tuberculosis and tibio-tarsal white-swelling, considering the mechanism of infection and the different methods of operating.

Tuberculosis of Trochanter.—Le Fort³_{Dec. 17, '90} describes an affection which he has named trochanteritis. It is essentially a central osteitis of the great trochanter, and is quite distinct from trochanteric periostitis and coxalgia, although a severe osseous form of the latter may result if the disease is not checked by proper treatment. The great trochanter becomes thickened and painful, while the usual signs of coxalgia are absent,—articular pain, shortening, loss of function. Extension is of no avail; the focus must be laid open with a chisel and scraped out thoroughly.

Tuberculosis of Vertebrae.—Laffitte⁷_{Nov. 17} mentions a case of tuberculosis of the vertebral column leading to complete spontaneous fracture followed by paralysis and death.

Osteomyelitis.—In 35 cases of osteomyelitis referred to by Lannelongue,¹¹⁸_{May} 21 were caused by the staphylococcus pyogenes aureus, 7 by the staphylococcus pyogenes albus, 3 by the streptococcus pyogenes, 2 by the pneumococcus, and 2 by species unknown. He claims that it is possible to easily distinguish by the symptoms between osteomyelitis due to the streptococcus and that due to the staphylococcus,—the fever in the former being more irregular, the skin over the affected region much redder, with angioleucitis and painful adenitis. The metastases due to the streptococcus are articular, synovial, and serous; while those in which the staphylococcus are concerned are visceral. In the staphylococcus variety the patients are often young,—perhaps newborn; and in the latter case the mother has probably had puerperal fever. The streptococcus is less liable to attack bony tissue, thus causing fewer sequestra and denudations of epiphyses. If there are no complications, the streptococcus variety offers a better chance of recovery. In osteomyelitis from the pneumococcus the bony lesions were still less than when the affection was due to the streptococcus, but suppurative arthritis was found to be present. He concludes that where the disease is due to the streptococcus it is necessary to extensively remove the soft parts with but slight if any interference with the bone.

Garré⁸⁴_{Sept. 9} discusses some forms of acute infectious osteomyelitis: (1) periostitis aluminosa; (2) the subacute form; (3) the

sclerotic, non-suppurating form ; (4) the relapsing form ; (5) bone-abscesses.

V. Jaksch⁸⁴_{Dec. 9, '90} describes a case of periostitis aluminosa, which the clinical course, as well as the bacteriological investigation, proved to be a modified form of acute osteomyelitis. Neve³⁶_{Jan.} concludes that (*a*) the chief starting-point and focus of osteomyelitis is on the diaphyseal side of the epiphyseal line ; (*b*) this is apt to implicate all the medullary elements of the bone and periosteum ; (*c*) as a primary local affection it may be distinguished as juxta-epiphyseal osteomyelitis ; (*d*) the term epiphysitis should be reserved for inflammation in the osseous tissue of the epiphysis ; (*e*) the cartilage of the epiphyseal line is not the seat of a primary lesion ; (*f*) epiphysitis may occur simultaneously with juxta-epiphyseal osteomyelitis, or secondarily to it by contiguity or perforation of the cartilage, and, *vice versa*, may give rise to it ; (*g*) acute arthritis is frequent in infants, as the result of juxta-epiphyseal disease, and in them complete necrosis of the shaft is less common ; (*h*) at a later age necrosis is more common than acute arthritis from this cause ; (*i*) conservative surgery should preserve the epiphyseal cartilage with as much care as it bestows on the periosteum ; (*j*) but the disc of one end of a bone does not appear essential to its symmetrical growth.

Sabrazès¹⁸⁸_{June 7} has seen a case of osteomyelitis of the right humerus following a staphylococcus infection from vaccination, and a case of osteomyelitis (staphylococcus) of the tibia, in a convalescent from typhoid fever, is noted by Lebeau and Deschamps.³⁷⁸_{Feb. 12} The medulla was chiseled open, the case making a satisfactory recovery. The following points are insisted upon by Trélat¹⁶⁴_{Mar. 19}: (1) the disease may appear during adult life, although, without doubt, much less frequently than in infancy or adolescence ; (2) with adults the affection may be chronic from the first, beginning insidiously and progressing slowly ; (3) osteomyelitis and osseous tuberculosis may co-exist or succeed each other. Several peculiarities of osteomyelitis of the ribs are emphasized by Berthomier. He says that two epiphyseal foci are often observed,—one anteriorly at the chondro-costal junction, and the other posteriorly in the head of the bone next to the pleural cavity, the latter four giving rise to all the signs of a pleuritic effusion. The two foci communicate with each other even when no evidence of their communication exists.

Max Jordan ⁷⁶¹_{R.T.P. 498} advocates early resection in acute osteomyelitis of the epiphyses of the femur, and reports 2 very successful cases, both as regards cure and subsequent function of the limb. Thelen, in commenting upon Jordan's paper, says that after resecting the head of the femur, which is always necessary, the parts should be carefully examined for disease of the acetabulum, which is easily overlooked. Lehmann, ¹³_{June} in a dissertation on the causes and treatment of acute osteomyelitis of the long bones, arrives at the following conclusions, which are essentially those of Czerny: (1) the medullary cavity should be opened, scraped out, and disinfected as early in the course of the disease as possible; (2) either the chisel or the trephine may be employed; (3) when the diagnosis is uncertain, pus is most likely to be found, if it be present, in the lower third of the femur and upper half of the tibia. Thelen ⁶_{Oct. 10} also recommends early operation.

Osteomalacia.—Kurtz ⁴⁴_{Aug.} recommends castration in osteomalacia, and Schauta ¹⁷_{Feb. 26} reports a case successfully treated by removal of enlarged ovaries. Rundle ²_{Sept. 19} mentions an extreme case of osteomalacia lasting six years and ending fatally.

Osteitis Deformans.—In continuation of the series of papers on osteitis deformans, ²²_{Nov. 26 to Dec. 24, '90} mentioned in last year's ANNUAL, illustrated articles have been contributed by Lunn, Mackenzie, Humphry, and Bowlby. Lunn reports 5 cases. Sharkey examined the occipital bone of 1 case microscopically, the most striking features being: (1) irregularity in anatomical structure; (2) rarefying osteitis appeared to be the predominant process; (3) the bone-corpuscles were distributed with great irregularity; (4) the bone-lacunæ were mostly small and shrunken; (5) there was slight appearance of lamellar arrangement in the walls of the Haversian canals; (6) there was also irregular crossing lines in the walls of the Haversian canals, the nature of which was not evident. Mackenzie reported a case of arrested osteitis deformans in which fracture of the affected bones from slight indirect violence occurred, union taking place without difficulty. Bowlby calls attention to a case lasting ten years, in which, contrary to the rule, but a single bone—the femur—was affected. The view that the process is of an inflammatory nature is supported by the appearance of the bone as a whole and by the presence of a sequestrum. The patient was a sufferer from gout, and there was associated

osteo-arthritis of the hip- and knee- joints. Humphry also describes "a remarkable and, perhaps, unique specimen, in which the bones of the upper limbs were affected, while the bones of the lower limbs presented very little trace of the disease." McKenzie³⁹_{July 18} saw Paget's disease in a woman of 70; and a case of osteitis deformans of the lower extremities due to hereditary syphilis is reported by Werther.⁶⁹_{June 18}

A case of *osteo-arthropathie hypertrophiente pneumique* recently described by Martin, is mentioned by Rauzier.⁸_{Feb. 14} Bamberger¹¹⁴_{B. 18, H. 2, 4, 70} has investigated with much thoroughness the bone changes occurring in chronic diseases of the lungs and heart, reporting 11 cases in detail. In patients having clubbed fingers there is apt to exist a thickening of some of the long bones, together with tenderness, particularly those of the leg and forearm, due to a periostitis. Age seems to have little influence in determining the affection. Some patients say that the bone trouble began when the sputum became putrid. Whether spontaneous recovery ever takes place is not known to the author. The changes in the bone may be more or less symmetrical, or one side may be affected much more than the other. Pain, increased by walking, is often complained of. The theory that some chemical substance produced in the diseased lungs acts, like phosphorus, as an irritant to the bones, is probably near the truth. In heart-lesions disturbances of the circulation are perhaps the cause, although the disturbances which usually exist in the lungs must also be considered. The author, however, finds himself unable to offer a solution of the question which will cover all cases, and considers it probable that various causes in reality exist.

Martin²⁴³_{Oct.} claims that periosteo-arthritic inflammation of the metatarsus, following long marches, in soldiers, is not due, as claimed by Pauzat, to pressure of the shoe, nor, as stated by Poulet, to a form of rheumatism; but to a gradual giving way of the ligaments from oft-repeated strain, although this strain may not be at any time excessive. Martin reports 18 cases, 11 of which were simply periostitis.

Periostitis of the internal face of the tibia, with synovitis of the extensor tendons of the foot, of blennorrhagic origin, is reported by Ozenne.³_{Mar. 12, 14} Mouisset²¹¹_{July 6} insists that the typhoid bacillus is a pyogenic micro-organism, and supports his view by a case of

suppurative periostitis following typhoid fever, in which only the typhoid bacillus was found, and by quoting the other investigators who have reported similar cases. Helferich,⁸⁴ has seen 3 cases of inflammation of the true ribs in connection with typhoid fever. He advocates resection of the diseased portion of rib with its thickened periosteum and scraping of the soft parts with a

sharp spoon. The affection is referred directly to the typhoid bacillus. Neve,²¹¹ concludes that (a) periostitis, inflammation of the epiphyses, necrosis, or arthritis may follow an exanthematic fever, particularly variola; (b) as a rule, these complications appear at the termination of convalescence; (c) in typhoid fever periostitis of the long bones, generally the tibia, is most often seen, while arthritis is rarely met with; (d) alveolar necrosis is not rare, and is seen most often in connection with scarlatina and measles; (e) following variola, may occur, in the order of their frequency, arthritis, necrosis of the long bones, and suppurative inflammation of the epiphyses, they being ob-

ARTHRITIS DEFORMANS OF GORILLA.
(*Revue Scientifique.*)

served most often in the young; (f) all these lesions have a tendency to spontaneous recovery by suppuration, expulsion of sequestra, and articular ankylosis; (g) the treatment consists in excision, drainage, and removal of sequestra, etc.

Eve,⁶ discusses senile changes in the bones and some senile diseases of the osseous system.

A very unique case is described by Bell,⁸¹ in which, from a lady

of 71, during the last twenty-one years, 500 pieces or sections of apparently healthy bone have separated from various osseous structures of the body, and been spontaneously expelled through the soft parts and skin.

Lesions occurring in the bones of apes have been studied by Rollet.²⁰⁸_{Aug. 15} The skeletons of 42 chimpanzees, 26 gorillas, and 11 ourang-outangs were examined in various museums. Five fractures of long bones were observed, some of them as perfectly united as if the limbs had been immobilized. The skeletons of 5 gorillas out of 16 showed evidence of arthritis deformans,—31.2 per cent. (See illustration.) Of bone inflammations were noted 2 cases of osteomyelitis, a condition resembling tubercular osteoperiostitis, a tubercular osseous abscess opening externally, periostoses, and exostosis.

BONE-GROWTH.

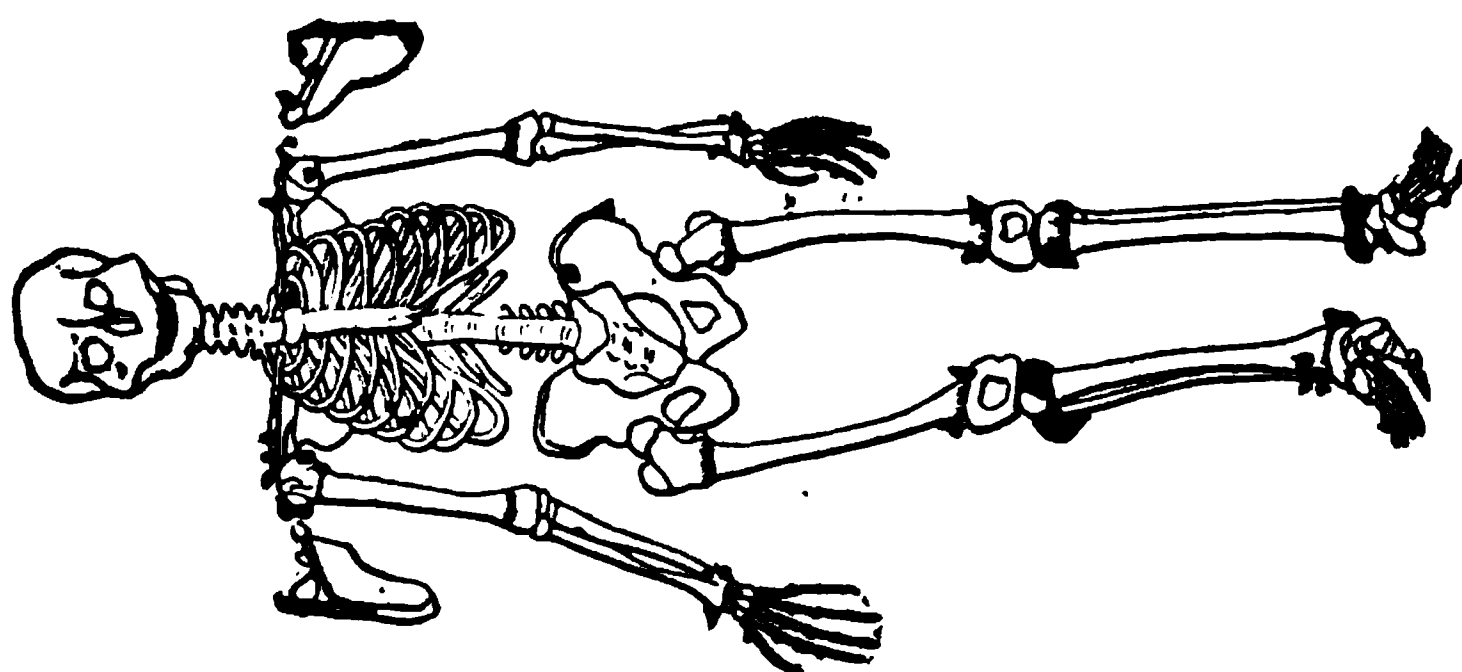
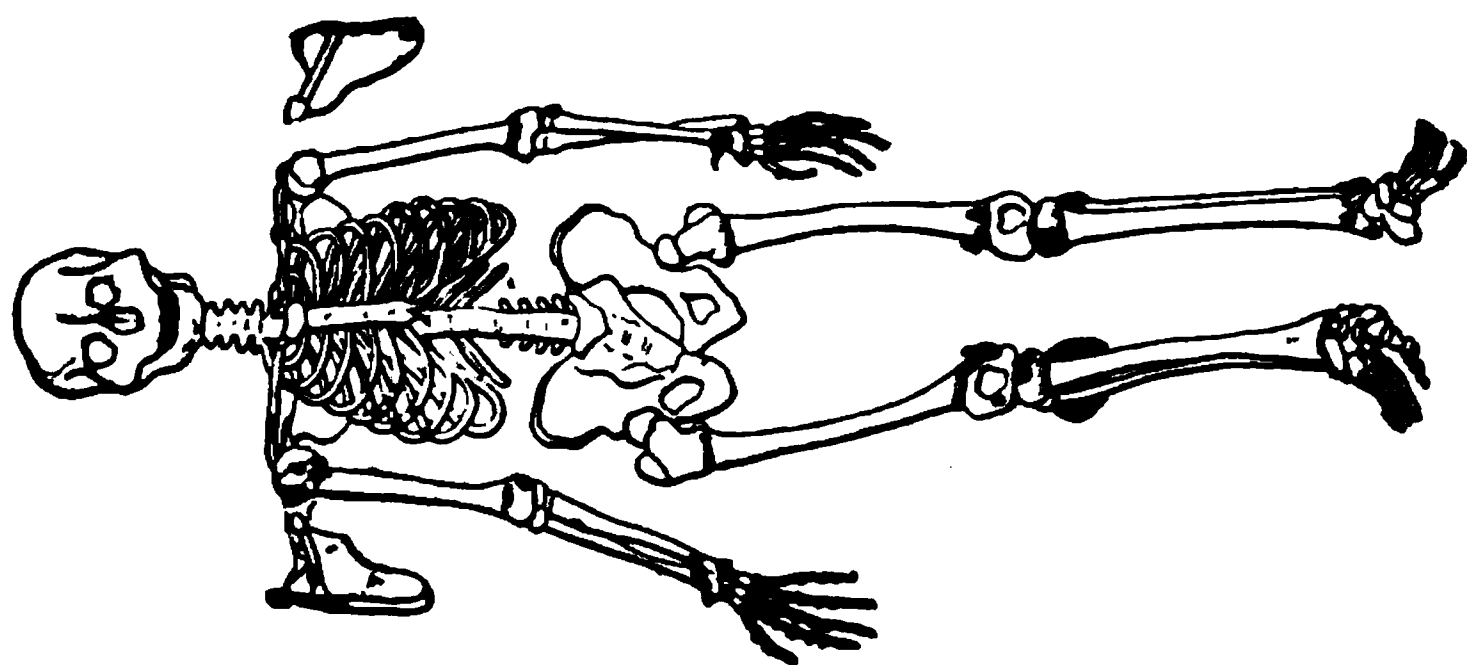
Volkmann's theory of the atrophy of bone from increased pressure and its increase from lessened pressure is criticized at length by J. Wolff,⁶⁹_{May 14} who endeavors to show, by mathematical, clinical, and pathological facts, that exactly the opposite condition of things in reality exists. He formulates the law, as it should be, as follows: Wherever a force exerts pressure or extension upon a bone increase of the bone-substance takes place, the largest increase occurring some distance from the point of application of the force and the smallest increase near to that point. Wherever a decrease of pressure or extension exists, more or less atrophy of the bone takes place.

Basing his results on 500 subperiosteal resections, Ollier,⁶_{Jan. 24} says that, in extensive resections for tuberculosis, the bone is not reproduced; hence, the tubercular focus only should be removed. He maintains that, as the periosteal production of bone is but slight, it is better to leave a thin layer of bone beneath the periosteum.

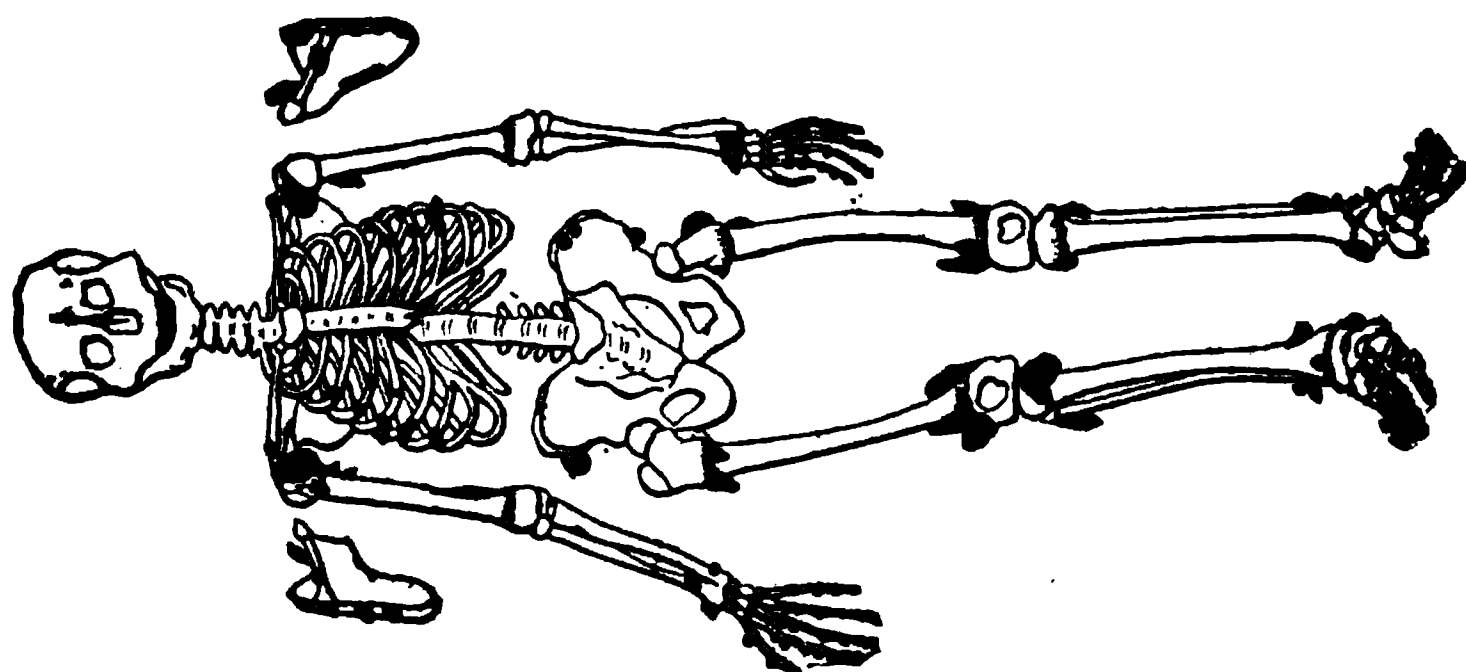
Departure from the normal lengths of bones, following injuries and diseases of the epiphyseal line, is considered by Tubby.⁶_{June 6}

Exostoses.—Maclean,¹³¹_{Dec. 70} describes 6 cases of multiple cancellous exostoses occurring in the same family. Heredity was manifestly present, but there was nothing to support the idea that the affection was of syphilitic or rheumatic origin, or that it was due

to the effects of intermarriage. There was likewise nothing in the cases pointing to a retrograde metamorphosis. There were, however, some evidences of rickets. (The illustrations indicate, by



MULTIPLE CANCELLOUS EXOSTOSES.
(*Bristol Medico-Chirurgical Journal.*)



means of black spots, the localities of the exostoses in 3 of the cases.) Rubinstein ⁶⁹_{Mar. 26} reports a case of multiple exostoses with disturbances in the growth of the bones, the case agreeing, in its main features,

with the 28 cases reported by Bessel-Hagen.²⁰³²_{p.471} Rubinstein, however, is not inclined to accept Bessel-Hagen's view that a direct relation exists between the size of the exostoses and the decrease in the growth of the bones. Schüller believes that the condition is not one of primary retardation of growth, but one of primary overgrowth, in which all growth ceases sooner than under ordinary circumstances. In conclusion, the writer emphasizes the fact that multiple exostoses are usually accompanied by marked pelvic abnormalities, which should be taken account of in obstetric manipulations. Orlow³⁰¹_{B.31,p.298} operated on an exostosis bursata springing from the lower third of the femur. He regards these exostoses as growths springing from epiphyseal cartilage, the bursa being of secondary origin.

Osteosarcoma.—Duplay¹⁰⁰_{Oct.8} considers osteosarcoma of the inferior extremity of the femur, with especial regard to early diagnosis. He calls attention to the statistics of Schwartz, which show that 81 out of 206 cases of osteosarcoma originated at the point named. Out of 150 cases of osteosarcomata, 46 occurred before 20 years of age and 94 before 40 years. Duplay has never succeeded in avoiding recurrence of the disease. Seydel³³⁶_{No.51,70} mentions a rare case of osteochondro-sarcoma of the ribs in a young man of 22, and Gussenbauer⁴⁰⁵_{B.31,p.473} writes on the extirpation of tumors of the pelvic bones, and contributes 7 cases of his own, mostly sarcomata.

Hildebrand³⁰¹_{B.31,p.298} describes a tubular angeiosarcoma of the humerus. But 8 similar cases are on record; although Hildebrand suggests that these tumors are at times mistaken for other growths.

In writing of the insidious bone-lesions accompanying mammary carcinoma, Snow⁶_{Mar.14} comes to the conclusions (1) that bone-lesions in connection with breast-carcinomata are ordinary phenomena of the later stage of the disease; (2) that the condition depends not solely on absorption of calcareous salts, but on actual deposit of malignant cells in the marrow; (3) that the cancer-cells may thus remain latent for several years without any conspicuous indications of their presence. Mosetig-Moorhof¹¹³_{No.6} claims to have had very encouraging results by the hypodermatic injection into malignant tumors of solutions of methyl-violet (1 to 1000, 1 to 500, 1 to 300), repeated every two or three days, some cases being apparently cured and others undergoing great improvement.

Myositis Ossificans.—Macdonald²_{Aug. 20} gives the notes of a case of myositis ossificans, in a girl of 4 years, in which ossification had taken place in all the superficial muscles of the neck, the tendons of the latissimus dorsi and teres major on both sides, the axillary borders of the pectoralis major and minor on both sides, and also the superficial muscles of the back. The affection was confined to the muscles of the trunk, whereas in the few other cases recorded it was the extremities which suffered. The ossified teres major was removed by operation. Cohen³³⁶_{July 22} also cites 4 cases of myositis ossificans, with microscopical investigations. With Mays, he regards the new bone-growth as essentially a tumor. He recommends, with Helferich, the complete extirpation not only of the tumor, but of the entire affected muscle, where possible, and of the adjacent periosteum and superficial layer of the bone. Svenson⁶⁸_{Aug.} refers to a case of progressive multiple myositis ossificans, in a boy of 14 years, apparently due to traumatism, and affecting the latissimus dorsi, teres major, and some other muscles of the back; and Munro⁶_{Feb. 21} reports an ossifying myositis of the vastus externus following a blow. Oliver⁵³_{May 1} removed an extensive bony deposit from the tendon of the triceps extensor muscle, apparently due to a blow combined with continued friction of the elbow upon the dash-board of a street-car, of which the patient was the driver.

DISEASES OF JOINTS.

Tuberculosis. — Krause²⁰³³ believes that the tuberculosis of bones and joints is generally produced not by emboli, but by bacilli floating in the blood-currents.

Lannelongue²²_{July 18} introduces a new treatment for tuberculosis of the joints and of certain other parts of the human body, the invention of the method being also claimed, however, by Le Fort. This method is to cause a sclerosis not of the tubercular foci themselves, but of the tissues surrounding them, on the assumption that the tubercular process will then subside. Chloride of zinc (a 1-in-10 solution) seems to be the drug best suited to this purpose. The general health of the patient is but slightly affected, the temperature never rising above 39° C. (102.2° F.). In very young children, or when the tissues are thin, it is better to go as deep as possible, to prevent superficial sloughing, and employ weak solutions,—say 1 to 20. Coudray¹⁵²_{Sept. 25} reports a series of cases

of surgical tuberculosis treated by Lannelongue's method, the majority of which were cured and some much improved. The tendency of both Lannelongue and Coudray is to increase the doses, as much as 30 or 40 drops of a 1-in-10 solution being at times employed, even in children.

Max Schüller²⁰³⁴ describes a new method of treatment of tuberculosis, especially of surgical tuberculosis. He does not assert that the process will cure all cases, but intends it to be used chiefly in connection with operative procedures. His conclusions, which are quite favorable, have been arrived at by numerous experiments upon animals and trials upon tubercular patients. The remedies which he has used include benzoate of soda, creasote, guaiacol, and others, the last named giving the best results. The guaiacol is administered by inhalation in steam,—6 grammes (1½ drachms) to 1 quart (1 litre); or in pills made from a concentrated extract of the wood,—0.025 gramme ($\frac{2}{5}$ grain) for children and 0.05 gramme ($\frac{4}{5}$ grain) for adults; or it may be given in solution,—guaiacol, 3 to 5 grammes ($\frac{3}{4}$ to $\frac{1}{4}$ drachm); sp. vini rect., aq. menth. pip., āā 150 grammes (4½ ounces); olei papaveris, or olei jecoris aselli, 30 to 50 grammes (1 to 1¾ ounces),—a tablespoonful four or five times a day in water, beer, or milk.

Senger⁵⁷ claims that the curative effects of iodoform injections in tuberculosis are due not to the iodoform itself, but to its decomposition products,—formic acid, iodic acid, etc. Carrying out this idea, he employs the following formula: Iodoform, 2.0; glycerin, 20.0; sodium formate, 0.5 to 1.5 (for adults, 3.0). Senn⁹⁹ attributes the greatest value to iodoform by parenchymatous and intra-articular injections, but condemns its ethereal solution, and places balsam of Peru next.

Coudray¹⁵² discusses ignipuncture in the tuberculosis of joints, reporting 6 cases. Cousins² prefers scraping to resection in bad, suppurating cases of hip-joint disease. A thorough consideration of the symptoms and diagnosis of tubercular osteitis of joints is presented by Young.¹¹² Dollinger⁸¹ says that out of 118 cases of hip-joint inflammation 102 were tuberculous in origin. Kellogg¹²⁰ urges the necessity of removal of the acetabulum, when diseased, in resection of the hip-joint for tuberculosis. Plicque,¹⁰⁰ in an article on the treatment of tuberculosis of the knee-joint in children, contends that conservative treatment gives

just as good results as operative interference, and with less danger.

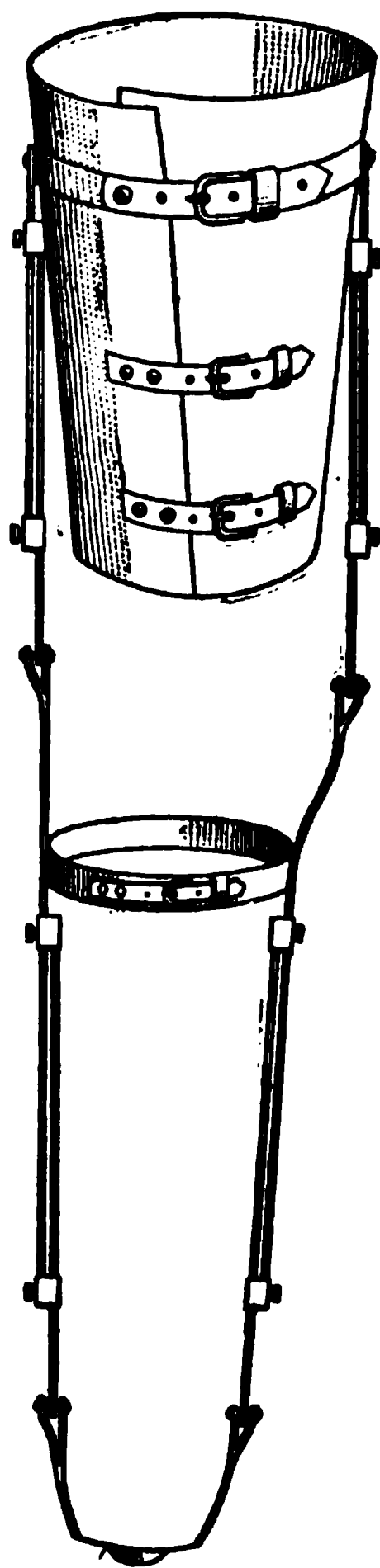
Audry²¹¹_{June 14} calls attention to pes cavus occurring in individuals affected with tuberculosis of the knee-joint, reporting 8 cases. The writer thinks himself justified in saying that pes cavus, of more or less severity, exists in the great majority of cases of tuberculosis of the knee, but he has been unable to find it in patients having other knee-joint affections. The relation of the biceps cruris muscle to diseases of the knee-joint has been carefully studied by Eliza Mosher.⁹⁶_{Nov.} She concludes that, in a large number of joint diseases, the action of this muscle is a marked source of irritation, and suggests myotomy as the best form of treatment. Garré⁷⁶¹_{Aug. 1, 1892} has demonstrated the rarity of primary tuberculosis of the tendon-sheaths, having observed the affection but 25 times in 7000 surgical cases. Peugniez²³⁰_{Aug.} operated on a case of primary tuberculosis of a serous bursa. Robson⁶_{Apr. 25} removed three large fibroid polypi, not hypertrophied fringes, from the knee-joint. The recovery of function was perfect. A case of arborescent lipoma of the knee-joint, in which removal was practiced, with recovery, is described by Bazy.⁷_{Nov., '90}

Schreiber⁸⁵⁹_{No. 1} reports a suppurative arthritis of the knee following erysipelas, in which was found Fehleisen's streptococcus; while Macaigne⁷_{June 19} records a case of purulent arthritis of the knee due to the pneumococcus; and Schwarz¹⁶⁴_{June 4} saw a case of periarthritic abscess of the shoulder, in which were found large numbers of pneumococci alone. Sayre¹_{Dec. 13, '90} notes the simultaneous occurrence of disease of the knee and hip in the same limb, and describes a new form of apparatus for its treatment.

Popliteal cysts, according to Poirier,⁷³_{No. 43} are always of articular origin, his statement being based on the examination of over a thousand knee-joints. Riedel,³³⁶_{Mar. 21} contrary to accepted opinion, contends that free pieces of bone in joints are quite often the result of chipping fractures due to slight injuries as well as severe ones, and supports his views by the observations of König, himself, and others. Mursell⁶_{Sept. 26} successfully treated a case of ankylosis following excision of the elbow-joint by hypnotic suggestion. He remarks that movement was perhaps much easier in the hypnotic state, owing to the absence of pain. Tabetic arthropathies are discussed by Fournier.²_{June}

Duckworth,¹⁸⁷_{July} in an article on "The Nosological Position and Relations of Chronic Rheumatic Arthritis," agrees with Friedländer that the disease has its origin in changes in the joint-centres in the central nervous system, but doubts the influence of micro-organisms. Mansell-Moullin,⁶_{July 18} calls attention to 3 cases of suppuration occurring in joints affected with osteo-arthritis, although such joints are said never to suppurate. The presence of synovial diverticulæ seems to favor suppuration. Hartley,¹_{Dec. 12, '70} gives a detailed account of chronic disturbances in joints, with particular reference to points of diagnosis. Raymond,⁵⁵_{Jan. 3} mentions a case of multiple joint disease followed by general muscular atrophy. He regards the muscular atrophy as due to ptomaine intoxication; the ptomaines proceeding from a mixed infection occurring during the course of a gonorrhœa. Charcot,²¹²_{July 10} calls attention to hysterical arthropathy, and notes that the affection has sometimes led to unnecessary amputation. Intense pain and even swelling, and a light form of genuine arthritis, may be present. The excessive tenderness of the skin is an excellent diagnostic point. Anæsthesia is of great use in clearing up an obscure case. Those cases recover best in which no local treatment is adopted. Immobilization may lead to fibrous adhesions. The affection may be produced by hypnotic suggestion, and, unlike the spontaneous form, it may be made to disappear by a counter-suggestion. Roswell Park,⁹⁰_{Nov.} considers the subject of mixed infection in relation to bones and joints.

Waibel,³⁴_{Dec. 20, '70} has noticed in a number of instances a hitherto undescribed disease,—a distinct acute inflammation of the tendons and ligaments about joints, due not to changes in temperature nor



ELASTIC EXTENSION IN JOINT
DISEASE.

(*International Jour. of Surgery.*)

to "rheumatism," but to mechanical insults of the parts favored by "predisposition." McCurdy¹⁰¹ makes "the sweeping statement that elastic extension, properly used, in any case of synovitis of the human anatomy will cure it, even in the stages of suppuration, with little ankylosis or deformity." He applies extension by means of an apparatus of his own (see illustration, page 29), provided with a system of sliding-bars and buttons, around which latter elastic bands are thrown, thus causing extension of the joint.

Myeloma of tendon-sheaths, says Heurtaux,³⁸⁰ has always been found, for some unexplained reason, about the flexor tendons of the right hand. The sheath of the tendon and the synovial membrane are always involved, but never the surrounding tissues, thus proving the non-malignancy of the growths.

PLASTIC SURGERY.

Bone-Grafting.—Kümmell⁶⁹ communicates an interesting and exhaustive article on the implantation of bone, reporting 17 cases. His methods are essentially those of Senn. He employs largely pieces of partially decalcified bone with solid centres, and fashioned to the shape of the defect which he desires to fill. The author has convinced himself that in the presence of suppuration and fistulæ the removal of all the implanted bone-chips is unnecessary; the loosened pieces may be ex-

BONE-GRAFTING.
(*New England Medical
Monthly.*)

tracted, but there are always some which have become firmly attached, and these may be allowed to remain.

A. M. Phelps¹³⁸ describes an exceedingly interesting case of bone-grafting which he recently performed at the Charity Hospital. He says "the operation is a success in so far as it establishes the principle that it is possible to grow large masses of tissue from an animal to man, and to establish the circulation until union takes place between opposite species without danger to either. It also demonstrates that a growth of new bone takes place when a section of bone is transplanted and its nutrition maintained by the artery of the animal." The patient upon whom the operation was performed was a boy having an ununited fracture of the tibia

at the lower third, the fragments being separated about an inch. The bone-graft was obtained from the ulna of a dog, a short distance below the elbow-joint, in such a manner as to preserve its attachments to the nutrient artery and to the surrounding soft parts. The dog and the patient's leg were enveloped in appropriate dressings, and the graft inserted between the fragments of the tibia. The soft parts of dog and boy were then united. (See illustration.) Unfortunately, on the eleventh day the graft had to be severed from the dog, but a free oozing of blood demonstrated that circulation had been established. At the end of five weeks, when the graft had to be removed from the boy, it was found

BONE-GRAFTING.
(*New England Medical Monthly.*)

covered with a deposit of new bone, showing an effort to unite the fracture. (See illustration.) During the experiment the pulse and temperature of the boy rose and those of the dog fell until they approximated each other.

Von Bergmann³⁴ exhibited a specimen in which an extirpated metacarpal bone had been replaced by a piece of non-living bone. He asserts that bone-tissue can never truly be replaced in this manner, so as to give the firmness necessary to motion of the part. Grafts of living bone might heal in at once, but non-living material, such as ivory or ox-bone, always undergoes absorption. Glück,³⁵ in speaking of the cases in which he replaced defects in bones and joints with ivory, admits that, although the immediate

results were so favorable, the ultimate outcome, at least in tubercular cases, was not encouraging. ⁷⁵⁵_{B.41,H.1}

Juettner¹⁰¹_{Apr.} reports a case of necrosis of the tibia treated according to Glück's heteroplastic method. The ivory cylinder used measured five and two-eighths inches in length and five-eighths inch in diameter. Suppuration occurred, and amputation became necessary on the sixteenth day after the primary operation. The subjects of osteogenesis and osteoplasty are reviewed by Manley.¹⁹_{Aug.16} Ricord²⁸_{Sept.} successfully replaced a portion of the frontal bone, the size of a 5-shilling piece, removed during an operation for carcinoma, by means of a graft from the pelvis of a puppy. O'Keef¹¹⁷_{Mar.} reports 5 successful cases of bone-packing according to the method of Senn.

Tendons.—It is claimed by Rochet²¹¹_{Oct.26} that in cases of complete division of the flexor tendons of the hand, either recent or old, with such separation of the ends that direct union cannot be accomplished, a portion of the peripheral ends of the deep flexors may be so inserted into the gaps between the ends of the superficial flexors that the functions of the latter, and perhaps those of the former, may be recovered.

Skin-Grafting.—Schreiber⁸¹_{Nov.} writes extensively on the transplantation of large skin-flaps in order to prevent deformities from the contraction of cicatrices. He prefers this method, especially when a pedicle is retained, to the methods of Wolff, Thiersch, or Reverdin, and presents numerous cases, with illustrations. Witzel³³⁶_{No.46,70} calls attention to the fact that defects of mucous membranes may be closed with flaps of skin, which must be free from hair, or at least only covered by lanugo. The procedure may also be employed in defects of the trachea, larynx, œsophagus, urethra, or rectum. In a successful case mentioned half the larynx was removed for carcinoma, the gap being closed by a flap taken from the adjacent skin. Thorndike⁹⁹_{Feb.12} has collected 123 cases of skin-grafting according to the method of Thiersch, of which 102 (82.9 per cent.) were successful, 13 partially successful, and 8 were failures, 4 of which were in syphilitic subjects. Nancrede,²³_{Feb.} Kibler,⁶¹_{Aug.3} Palm,²_{Jan.14} and Jones¹⁸⁷_{Jan.} contribute articles on the subject.

FRACTURES AND DISLOCATIONS.

By LEWIS A. STIMSON, M.D.,

NEW YORK.

FRACTURES.

Massage.—The advantages of systematic massage of the injured limb, in hastening repair after fracture and in diminishing the chance of prolonged or permanent stiffness of neighboring joints, have been set forth by several writers during the year: Rosenblith, ²⁴_{Mar. 21} Landerer, ¹⁶⁹_{June} Huyberechts, ²⁸⁸_{Nov. 16} Kendal Franks. ¹⁶_{Nov.} Although they all speak enthusiastically of the results, the histories of the cases do not show any notable shortening of the period of repair as compared with that of cases treated only by splints. Treuthardt ¹⁹⁷_{May} uses persistent elastic compression to effect the rapid absorption of extravasated blood and œdema, which is claimed for massage, and combines with it early mobilization of the joint in articular fractures.

A suggestion of the uncertainty of conclusions, drawn from clinical observation, arises from a comparison of the claims made for massage and those for a method of treatment of fractures of the patella, and of delayed union after fracture of any long bone, introduced by the late Dr. Thomas, of Liverpool. It is claimed for massage that it benefits the patient and hastens repair by removing the inflammatory swelling and persistent œdema. Thomas sought to increase the œdema by obstructing the venous flow by tight bandages on the proximal side of the fracture, and claimed that he thereby hastened repair.

Glue Splints and Early Use of Limb.—Jürgensen ⁶⁹_{Nov. 27, '90} reports an exhibition of patients, made to members of the International Medical Congress in Berlin, to demonstrate the advantages of splints constructed on the plans of Hessing, the well-known instrument-maker, by which confinement to the bed, even in cases of fracture of the lower limb, could be avoided. The limb is wrapped in a very thin layer of cotton, and then surrounded by

(I-1)

short and rather narrow strips of linen soaked in carefully-prepared carpenters' glue and supplemented by very thin wooden splints. The dressing hardens in three or four hours, and then, in the case of the lower limb, a long metal splint, like a Thomas hip-splint, is applied to bear the weight of the body, and the patient is told to walk. Krause⁹⁹ strongly advises that patients with fracture of the leg or thigh should leave their beds in the second week and bear their weight upon the broken limb protected by a plaster splint.

Ununited Fracture.—Sommer⁷⁶¹ publishes a study of the cases of failure of union after fracture seen in the Zurich Clinic during seven years; 489 cases of recent fracture gave 6 cases of failure of union and 16 of delayed union. Eight additional cases of established failure of union were admitted. The operative treatment was by stimulation by nails or pegs and resection of the ends, usually with metallic suture. Seven successes in 14 operations.

Vertebræ.—Several cases of operation for the relief of symptoms attributed to injury of the cord after fracture of the spinal column have been reported during the year. The successful ones are those of Weiss,¹⁸⁴ Ridenour,²²² and Boyle.¹⁹ Weiss removed the arches of the tenth and eleventh dorsal vertebræ one month after the accident; amelioration promptly followed, and two months later the patient was able to walk. Ridenour operated immediately after the receipt of the injury, which was extensive and severe,—fracture of laminæ and spinous processes of seventh and eighth dorsal vertebræ and dislocation of the heads of two ribs and of the body of the seventh dorsal vertebra forward. He “removed all the bony roof from the middle of the ninth dorsal to and including middle of sixth dorsal vertebra; passing my finger between the body of seventh dorsal elevated it into position.” Sensation returned at once in both lower limbs, and the wound healed primarily. Six months later the patient was reported to be able to walk with the aid of a cane. In the case reported by Boyle the operation was done by Biddle two months after the accident; the bodies of the tenth, eleventh, and twelfth dorsal vertebræ were found to be displaced backward; the three posterior arches were cut away and “the posterior part of the bodies was chipped off and shaped up to relieve the cord.” Primary union.

Sensation and control of the muscles was slowly regained, and at the time of the report the patient was able to "stand up and walk with the aid of parallel bars." The unsuccessful cases were by De Forest Willard,²⁰¹¹ Dodge,¹⁸⁵_{Sept.} and Audry.²¹¹_{Nov. 1} In all these cases the operation was done within a day or two after the accident, and the patients survived for from six hours to three weeks. On the other hand, a case reported by Villard²¹¹_{June 21} is another example of complete recovery after fracture with paraplegia without the aid of operation. Hadra²⁰¹²_{Apr. 23} reports a case of injury (apparently dislocation and fracture) of the sixth cervical vertebra, in which, several months after the accident, he effected great improvement by binding the spinous processes of the sixth and seventh together with silver wire, carried several times around them in a figure of eight, as a substitute for a stiff cravat.

Ribs.—Brown²³⁹_{Dec. 1, '90} reports a fracture of the second rib near its cartilage on the left side, caused by a paroxysm of coughing. The special interest of the case arises from the seat of the fracture, as it is rarely produced by muscular action above the sixth. In a case reported by S. C. Smith,⁶_{Jan. 24} the first three ribs and the scapula were broken and the subclavian artery and vein torn across by the fall of a heavy chain. The patient survived sixteen hours. "The first costal cartilage was separated from the sternum, and the first rib was broken about an inch farther outward and again just external to the neck. The two next ribs were broken outside the neck."

Scapula.—A case of the rare injury, fracture of the body (or inferior angle) of the scapula by muscular action, is reported by Jos. Leidy, Jr.¹¹²_{Mar.} The patient, while falling, grasped a rope, and immediately felt sharp pains in the shoulder. By grasping the inferior angle and steadying the spine of the scapula, abnormal mobility and crepitation could be demonstrated. The position of the line of fracture is not stated, but the case is entitled "fracture of the body of the scapula."

Clavicle.—Simpson³⁶_{June} reports a fracture of the clavicle in the middle third, caused by the recoil of a rifle fired on a 600-yard range. Poirier,³_{Sept. 12} in connection with a case in which he removed by operation a completely detached fragment of the clavicle, reports a case of comminuted fracture of the clavicle by direct violence, with such injury of the brachial plexus that the use of the arm was

lost, and six months later the limb was removed at the shoulder because of the great pain that persisted.

Humerus ; Separation of the Epiphysis.—Rollet²¹¹ reports 2 cases in patients 15 and 17 years old, respectively, in which about a month after the accident Poncet cut down upon and chiseled away the projecting corner of the upper end of the shaft, but did not correct the angular union between the shaft and epiphysis.

Radius ; Partial Fracture of Head.—Cheyne² reports a case of fracture of the posterior half of the head of the radius, in a woman aged 26 years, apparently due to direct violence. The nature of the injury was overlooked at first, and when, six weeks later, the patient came under Cheyne's care the joint was almost fixed in the attitude of extension and pronation ; the loose fragment could be felt between the olecranon and head of the radius, and was removed by incision. Primary union, with marked improvement in function. He adds a brief note of a second case (kick by a horse) similarly treated, with good result. Delorme¹⁰⁰ reports a case, also by direct violence, treated by immobilization for a month, with complete restoration of function and apparent union of the fragments. The diagnosis was made by recognition of abnormal mobility of the undisplaced fragment with crepitation ; the fragment could be grasped between the thumb and finger and moved.

Carpal Bones.—In a specimen of fracture of the lower end of the radius, caused, in a young man, by a fall into the hold of a ship, presented by Rutherford,²¹³ in which the lower fragment was comminuted, there was also a fracture of the scaphoid across its middle. A point of interest, in addition to the rarity of the fracture, is the mode of production, whether by direct violence or by hyperdorsal flexion of the wrist. The comminution of the lower end of the radius suggests direct violence ; but experiments by Dailiez²²⁰ show that similar fracture of the scaphoid, as well as of the semilunar and cuneiform, can be produced by forcible dorsal flexion ; and Stimson has recently presented to the New York Surgical Society a specimen of similar fracture of the scaphoid accompanying compound laceration of the anterior carpo-radial ligament, clearly due to dorsal flexion.

Femur.—Two cases of treatment of fracture of the neck of the femur by incision and pegging or wiring the pieces together

have been reported by Cheyne²_{Mar. 7}, and Dollinger.³³⁶_{June 6} Cheyne's patient was a feeble, alcoholic, old woman, suffering with an acute bronchitis that made recumbency impossible, and with infantile paralysis of the other leg. The operation was done three days after the accident, by an anterior incision which led at once into the joint. The fracture was at the base of the neck, with some comminution of the upper fragment, including a longitudinal fissure extending an undetermined distance toward and into the head. Two ivory pegs were driven through the trochanter into the neck, the wound closed without drainage, and the patient kept in a semi-recumbent posture, with the limb resting on a pillow and steadied by a plaster-of-Paris dressing and light weight extension. Primary healing of the incision; patient discharged with useful limb in four months. Dollinger's patient was a man 42 years old; the bone broke while he was walking, severe pain having been felt in the hip for some months previously. Treatment by continuous traction proving unsatisfactory because of the great sensitiveness of the patient, the fracture was exposed on the twenty-fifth day by a curved incision passing around the [front of the?] trochanter, and by dividing the muscular attachments to the latter; it was at the base of the neck, with partial disappearance of the latter and opening of the joint by perforation by the fragments. After removal of the splinters and blood, the neck and trochanter were drilled from before backward and fastened together with double silver wire; plaster-of-Paris; healing under one dressing in eight weeks.

Upper Third.—Lorenz⁸⁴_{Jan. 3, 10} reports an interesting case of successful correction, by open myotomy and refracture, of marked angular deformity and shortening after repeated fracture of the upper third of the femur in a rachitic child. After division of the bone at the angle, the lower segment was brought into line with the widely-abducted upper segment, and after union had taken place in this position the limb was gradually brought down to parallelism with the other. He recommends that division of contracted muscles should be adopted as a principle of treatment in such cases, in place of resection of bone, which necessarily involves shortening of the limb.

Shaft.—The committee appointed by the American Surgical Association, in 1890, to report what should be deemed a satisfac-

tory result of treatment of fracture of the shaft of the femur, submitted the following conclusions,⁹⁹ which were adopted by the Association: "A satisfactory result has been obtained in the treatment of fracture of the shaft of the femur: (1) when firm bony union exists; (2) when the long axis of the lower fragment is either directly continuous with that of the upper fragment or the axes are on nearly parallel lines, thus preventing angular deformity; (3) when the anterior surface of the lower fragment maintains nearly its normal relation to the plane of the upper fragment, thus preventing undue deviation of the foot from its normal position; (4) when the length of the limb is either exactly equal to that of its fellow, or the degree of shortening falls within the limits found to exist in 90 per cent. of healthy limbs, namely, from one-eighth of an inch to one inch; (5) when lameness, if present, is not due to more than one inch of shortening; (6) when the conditions attending the treatment prevent other results than those obtained."

Patella.—The papers of the year, on the subject of operative treatment of fracture of the patella, are numerous, but add little that is new. A number of successful cases, and, more important, successful series of cases, have been reported: Pilcher,⁹⁶ Dec., '90 5 cases; Lutz,¹⁰⁹ July 10 cases; Lucas-Championnière (quoted by Chaput,³ Jan. 17), 14 cases.

On the other hand, Fowler,⁹⁶ Jan. reports 13 cases (14 joints) operated upon, with extensive suppuration in joint and thigh in 5 cases (6 joints), and death, attributed to carbolic-acid poisoning, in 1; he attributes the suppuration to extensive rupture of the capsule and to direct violence, and argues that these should be deemed contra-indications for operation.

The presentation of facts has made it clear that the results of operative and of non-operative treatment in recent cases are both in the main good, that both give some functional failures or non-results, and that operative treatment occasionally leads to suppuration even in skillful hands. Apparently, the next point to be determined, before a general agreement can be reached, is the proportions of success and failure in the two methods, respectively, and whether groups of cases can be distinguished to which one or the other method is especially applicable. In the mean time, in my opinion, a distinct advance in the operative method is in view in the substitution of sutures placed in the fibrous tissues

for those passed through the bone. Chaput, ³_{June 17}, a partisan of the open method, reports successes obtained by silk suture of the fibro-periosteal covering of the bone; mediate suture by silk passed through the tendon of the quadriceps and the ligmentum patellæ, after incision, which was mentioned in the ANNUAL last year, has been again successfully employed a number of times by myself this year. Chaput protests against the indiscriminate use of the suture in *old cases with separation*. In his important thesis upon fracture of the patella (1885), he showed that the functional disability is much more often due to defective flexion than to defective extension, because of the inability of the upper fragment to descend. He has recently obtained a successful result in such a case by *excision of the upper fragment*, and he proposes that this should be resorted to in all cases in which the interval between the fragments is from 2 to 5 centimetres long, with diminution of flexion, and that both fragments should be excised in cases constituting his second group: short, rigid bond of union,—with lengthening of patella and diminution of flexion.

Fibula.—A singular case of fracture, apparently by muscular action, in a child, is reported by Chapin. ¹_{Sept. 12} The patient, 6 years old, while sitting on a table, was sharply told to get down. “The child, frightened, turned quickly, gave a cry of pain, and complained of his leg hurting him. He was unable to walk, and the mother discovered what she supposed to be a splinter in the outer side of his leg.” This proved to be the upper part of the broken fibula, the fracture being $2\frac{1}{2}$ inches below the head of the bone.

DISLOCATIONS.

Vertebræ.—Franchomme ²²⁰_{May 20} reports an interesting case of double unilateral dislocation of the cervical spine, caused by a fall from a height of ten feet. Paralysis of motion and sensation in lower half of the body, subsequently extending to portions of the arms. Pulse, 50; rectal temperature, 90.7° F. (32.5° C.). In two days the temperature rose to normal, and in two more to 107.4° F. (42° C.) just before death. The autopsy showed right unilateral subluxation of the atlas forward by rotation on the axis and right complete unilateral dislocation by rotation in the same direction of the sixth from the seventh cervical, with fracture of the left articular processes of the sixth and seventh. Hæmorrhage

within the cord and its canal, from the level of the third cervical to that of the fourth dorsal.

Clavicle.—Carragher,⁸¹ reports 2 cases of *simultaneous dislocation* of the sternal ends of *both clavicles*, forward. Reduction was maintained in each case by a bandage around the shoulders, crossing the chest in *front* in a figure-of-eight.

Shoulder.—Colc,¹ reports a simple and easy method of reduction in recent cases, which has proved effectual in about two-thirds of the cases in which it has been tried. The procedure is as follows: "The wrist of the affected side lies loosely in the corresponding hand of the surgeon, the patient's forearm is flexed on the arm to an angle of 90 degrees, and at a moment of complete [muscular] relaxation the surgeon, with his disengaged hand, makes quick downward traction [at the fold of the elbow], followed immediately by slight external rotation."

The treatment of *old dislocations* by arthrotomy, or excision of the head of the humerus, has been further discussed during the year; additional cases have been reported and collections of cases made (Smital,⁸⁴ and Gwyer,¹). According to the statistics, resection appears to be more frequently done than reduction by arthrotomy, and to yield better functional results. Smital gives 62 per cent. of success after resection, and only 33 per cent. after arthrotomy. He also calls attention to the importance of considering the condition of the shoulder-muscles before resorting to operation, for if they are hopelessly paralyzed and atrophied the creation of a flail-joint will be no gain.

Elbow.—The treatment of old dislocations of the elbow has been the subject of formal articles by Vamossy,⁸ Kunn,⁵⁷ and Stimson.¹ Kunn's paper, which includes also a study of gunshot injuries of the elbow, gives Maydl's experience in 6 cases of dislocation, between 1883 and 1889, 5 of them treated by partial or complete resection and 1 by arthrotomy. Vamossy gives Nicoladoni's experience, 9 cases treated by arthrotomy and reduction, all successful (1886-1890). Stimson gives 6 personal cases (1886-1890), successfully treated by arthrotomy and reduction. In all of Nicoladoni's and Stimson's cases except two the operation was done by two lateral incisions. Stimson calls particular attention to a new growth of bone found on the back of the external condyle in all the cases, which formed a new socket for the head of the

radius, and constituted a barrier to reduction that could be removed only by operation. Vamosy notes the presence of a similar nodule in some of his cases, but interprets it as the broken and displaced external epicondyle. The excellent functional results obtained in these cases and the character of the obstacles to reduction show the advisability of resort to operation in preference to attempts to reduce by non-operative methods.

Lower End of Ulna.—Holst³³⁶_{June 20} reports a case of dislocation of the lower end of the ulna forward by direct pressure during supination. Horrocks⁶_{June 27} reports one of dislocation backward that had remained unreduced for two months; and Ridlon¹_{Apr. 25} one of backward dislocation that recurred whenever the forearm was supinated.

Hip.—Crile⁹⁶_{May} reports a case of dislocation of the hip complicated by fracture of the rim of the acetabulum and of the head of the femur. The injury was caused by a fall from a height of thirty feet, and the patient died a few days later. The fragment of the rim of the acetabulum comprised about one-half of its length; that of the head of the femur was a piece intercepted by a plane parallel to the axis of the neck and apparently near its posterior surface; its base comprised about one-third of the periphery of the base of the head. Cheever⁹⁹_{May 28} reports a case of *compound dislocation* of the hip forward, caused by the fall of a case weighing 600 pounds. The patient was a man 50 years old. The head of the femur protruded through a small lacerated wound in the groin just below the anterior superior spine of the ilium. It was excised and a counter-opening was made in the outer side of the thigh. The patient survived two days. The autopsy revealed other injuries and extensive fat-embolism of the lungs.

Patella.—An outward dislocation of the patella of long standing, in a girl 21 years old, was successfully treated by a novel operation by Pollard.⁶_{May 20} The patella was three-eighths of an inch narrower than its fellow, and its descent along the external aspect of the condyle in flexion of the joint was painful. A pre-existing genu valgum had been corrected by supra-condylar osteotomy, under the impression that the dislocation recurred on flexion and was reduced by extension, but no benefit followed. Pollard opened the joint in the outer and inner sides and found “the trochlear surface of the femur exceedingly small in all its dimensions. The

groove was only broad enough to take the little finger, and the outer border of the groove prevented the replacement of the patella. . . . The cartilage and some of the bone were chiseled away until a sufficiently broad and deep trochlear surface was made. The patella could then be placed in the new articular surface, and during flexion and extension it slid downward and upward in a perfectly normal manner, the old tendency to external dislocation having quite disappeared. In order to secure the patella more safely in its new position, a strip of capsule, about one and a half inches long and three-quarters of an inch wide in the middle, was excised and the borders of the wound were sutured with silk." The patient was discharged on the thirty-second day, and four months later said her leg was more serviceable than before the operation.

Semilunar Cartilages.—Noble Smith,⁶ gives the results of his experience in the treatment of dislocation of a semilunar cartilage by manipulation and retention, an experience covering about ten years and a large number of cases, but apparently limited to dislocation of the internal meniscus forward and outward. His treatment is to reduce by pressure with the thumb while the joint is slightly moved. In one case, in which the dislocation had persisted, with much disability, for fifteen years, he thus effected an immediate reduction and a permanent cure. Stimson,¹ reports the successful removal of the partially-detached internal meniscus, which had been the cause of frequent painful arrest of movements of the joint.

DISEASES AND INJURIES OF ARTERIES AND VEINS.

By JOHN H. PACKARD, A.M., M.D.,

PHILADELPHIA.

ARTERIAL SYSTEM.

O'Connell Raye, ⁶_{July 28} publishes 6 cases of ligature of the main arteries which, although presenting no particularly remarkable features, are valuable as a contribution to the records of more recent operations. Published statistics of operations on the large arteries, being mainly derived from the experience of pre-antiseptic days, are somewhat misleading to the modern surgeon. The cases described include all the cases of ligature of the large vessels which occurred in the reporter's wards in the Medical College Hospital, Calcutta, during the past ten years. Of these cases, 5 were operations for aneurism and 1 for recurrent hæmorrhage. The wards contain eighty beds, and, as but 5 cases of aneurism entered them in ten years, the disease must be rather rare in Lower Bengal.

In 3 of the 5 cases of aneurism the treatment was commenced with compression, but from various causes this had to be abandoned in favor of ligature. All the cases so treated recovered without any trouble. In a fourth case the artery was ligatured without any previous compression. This case also ultimately recovered, but the leg was on the verge of gangrene. Raye's cases are too few to draw reliable conclusions from, but the inference seems to be, that compression is still the safest mode of treatment, and that, even when it has ultimately to be abandoned, its temporary use is of advantage in so far as it prepares the way for establishment of the collateral circulation.

Internal Carotid.—W. P. King, of Kansas City, ⁶⁶³_{July} reports a recovery in a case of intra-cranial aneurism of the internal carotid within the cavernous sinus, in which he practiced ligation of the common and external carotid and the superior thyroid arteries. The two latter vessels were ligated in addition to the common

carotid, owing to the intercommunication between the branches of the external carotid with its fellow of the opposite side, and because the superior thyroid was given off so near the bifurcation of the common carotid that the external carotid could not be tied below it.

Common Carotid.—Karewski,²² relates a case of aneurism of the common carotid, of interest both from a diagnostic and therapeutic point of view. The patient, a man aged 30, had been perfectly healthy since he had a chancre seven years before, but without the usual symptoms of general syphilis. There were frequent pharyngitis and hoarseness; he was temperate, and his calling required no special bodily exertion. At the end of May there was sudden pain in the right side of the neck, a feeling as if the tongue were swollen, swelling on the right side of the neck, hoarseness, but no other troubles. The tumor was of very slow growth.

On June 1, 1891, he showed on the right side of the neck, between the mastoid process and the hyoid bone, a tumor lying across, increasing in size below until it reached into the supra-clavicular fossa; there was no pulsation, no fluctuation, but compressibility. No murmur, no thrill, nor other after-sound; but two clear cardiac sounds were audible. Compression of the veins and carotid had no influence on the degree of fullness, but strong swelling, with Valsalva's test, occurred. The speech was aphonic, paralysis of the vocal cord and of the right side of the tongue being also present. No other paralysis. Pulse in both radials and temporals was equal, of the same tension, but not sclerotic. Prominence and redness of the right tonsils and the whole palatal arch. There were no subjective symptoms of murmur, hammering, knocking, or pain. The diagnosis oscillated between abscess, dermoid, blood-cyst, and aneurism.

The operation was performed on June 10th, which comprised ligation of the common carotid, opening of the aneurismal sac, emptying it of its contents, and tamponade suture. There was no reaction; no cerebral symptoms. Karewski concluded that the aneurism had a connection with the syphilis, which set up arterio-sclerosis. He mentioned compressibility as a pathognomonic symptom; in a certain sense it excluded fluctuation. In the absence of other cardinal symptoms it would lead on the right

path. In regard to treatment, he recommended both central and peripheral ligature, division of the sac, and tamponade as the surest method.

Innominate.—Frank Hartley¹_{Mar. 28} presented a specimen of an aneurism before the New York Surgical Society, February 11th, which had been operated upon some six years and a half before by McBurney. At that time the subclavian and common carotid were both tied. The patient had made a complete recovery, and had recently died, of Bright's disease, at the hospital. The man had not suffered from any pressure symptoms up to a week before his death. The aneurismal sac was found filled with a large laminated clot. The specimen had been prepared by J. S. Ely for the Museum of the College of Physicians and Surgeons.

R. M. Buchanan²¹³_{Oct.} describes a case of aneurism of the innominate artery, in which an opportunity presented itself of examining the parts post-mortem a few days after the introduction of needles according to Macewen's method. Although the operation was not successful in saving the life of the patient, Buchanan regards the local results as so striking as to induce the belief that the operation is likely to become of great service. The importance of the subject warrants the presentation of his own description of the local conditions:—

“The aneurism is a bulky mass about the size of the two closed fists, and the greater part of the sac lies to the right of the middle line. It extends upward as far as the pomum Adami, and projects backward by the side of the trachea to impinge on the right carotid. Inferiorly it is limited by the loose tissues in the anterior mediastinum, passing below the upper end of the sternum a short distance. It also extends downward a short distance in front of the sternum. Viewing the aneurism from behind, the only thing which attracts special note is expansion and prominence of the innominate artery.

“At this stage the aneurism is laid open in the middle line, and is seen to be really composed of two sacs,—one of which forms the original true aneurism and the other a secondary false aneurism. The true aneurism is an expansion of the innominate artery, with its anterior wall apparently formed of laminated clot. The false aneurism forming the bulk of the tumor in the neck contained about 10 ounces (300 grammes) of fluid and coagulated blood.

Its anterior wall is formed by the sterno-mastoid, sterno-hyoid, and sterno-thyroid muscles, much condensed and thinned, especially on the right side; its posterior wall, in the upper part by fascia overlying the trachea and blood-vessels, in the lower part by a mass of laminated thrombus. The latter is conical in form, and projects forward from a firm, broad base of attachment over the postero-inferior part of the sac. It is about the size of a hen's egg, of a brown color, and, on handling, is somewhat soft, although giving the impression of considerable toughness. The communication between the two aneurisms would appear to be closed by this thrombus formation, as no channel presents itself and a probe fails to discover one. The clavicles appear in the sides of the sac internally, the right for about two inches, the left for a much shorter distance. The inner end of the right clavicle presents an eroded surface, upon which the thrombus mass impinges. Extravasation of blood appears in the anterior wall at a point in the vicinity of each sterno-clavicular articulation. (These correspond with needle punctures.)

“The sac of the true aneurism, displayed by an opening made in its posterior wall, measures one and three-fourths inches by one and one-fourth, and projects forward and upward toward the false aneurism, from communication with which, however, it is clearly shut off by laminated clot. The orifice of the sac is comparatively large, commencing almost at the aorta and involving about an inch of the arterial wall in its antero-lateral aspect. From the margin of the orifice the coats of the vessel can be traced for varying distances till they are lost in the laminæ of the thrombus. The tissues around the lower part of the false aneurism are infiltrated with blood.

“A dissection is made to discover the relative position of the aneurism to important structures in the neck. The trachea and œsophagus are displaced somewhat toward the left, and the course of the left common carotid and subclavian is rendered slightly oblique near the aorta. The condition of the veins on this side does not appear to call for note. The left subclavian vein is plugged by a thrombus. On the right side the carotid and the vagus run along in contact with the posterior wall of the false aneurism. The vagus appears compressed by the true aneurism just as it passes over the subclavian and is giving off the recurrent

laryngeal. Both nerves, for a short distance beyond this point, are submitted to some tension.

“Further examination of the coagulum is made after hardening in spirit. Even after shrinking it measures an inch and three-eighths in thickness from before backward, and its base has a diameter of two inches from above downward. On section, the cut surface shows a striking and instructive appearance. The mass is obviously composed of two somewhat different constituents,—one pale, but not pure white; the other, dark brown. These are variously intermingled, sometimes with distinct stratification, especially in the deeper parts, but at other places with a less definite arrangement. The paler constituent is distinctly in excess of the darker, and in some places forms a considerably expanded area.

“Microscopical examination, which, on account of the nature of the structure, was made after imbedding in celloidin, confirms the conclusion, derived from the naked-eye appearances, that we have a mixed thrombus. The pale part is composed of fibrin and leucocytes. The fibrin is frequently condensed into homogeneous strands, having sometimes a granular appearance and at other times translucent, while in other places it has the usual finely reticulated appearance. It is in the latter that the leucocytes are manifest, and they are frequently present in very large numbers. This is especially plain in sections treated with alumcarmine, the leucocytes taking on the dye vigorously. The reddest parts of the thrombus are composed of red corpuscles along with fibrin, the latter small in quantity, but sometimes in the homogeneous strands mentioned above. It is particularly noticeable that stratification is much more distinctly visible in the sections under the microscope than on the cut surface of the mass as a whole. The former shows that the mass is stratified throughout, and that the strata are narrow and closely set, forming a finer stratification than that visible with the naked eye. This applies both to the darker and paler portions of the coagulum.”

Subclavian.—Macewen's treatment was employed by Page²²_{Aug. 12} on a man, aged about 40, with a large aneurism of the right subclavian. The needle used was about four or five inches long, and very slender; he introduced it for about an inch and a half, until he felt the point against the opposite wall of the aneurism, which

he then carefully scratched, by occasionally moving the needle about, leaving it in different positions during the intervals, when, as he explained, the current of blood would itself give a certain amount of motion, the object of this being the formation of white thrombi. This being the first time of the application of the procedure to this patient the wall of the aneurism was found to be very thin.

Page pointed out that, if the treatment proved successful, the parietes would be felt to be thicker each time; he remarked that, owing to the necessity of using such a very slender needle on this first occasion, it was difficult to reach any part of the opposite wall other than that immediately opposite the place of entry, as the needle, when given a slanting direction, seemed to bend over instead of remaining straight. He also thought this method of treatment of great value, especially in a case such as the one under consideration, as tying the innominate was always fatal, and ligaturing the subclavian on the distal side of the aneurism he did not consider of much use. The whole proceeding lasted about fifty minutes. No anæsthetic was given; for the operation is painless, as the patient himself asserted several times when questioned.

W. W. Keen, of Philadelphia, ¹⁹~~1887~~ reported 2 cases of subclavian aneurism, in which he had resorted to his method of controlling the circulation in the upper extremity by elastic compression. This, it will be remembered, is effected by means of a pad over the subclavian artery; which pad is held in place by the ordinary rubber bandage of the Esmarch apparatus, the elastic bandage being carried from the chest over the back, and then alternately between the thighs and under the opposite axilla. The first case was a failure, owing to the facts that the patient had a very prominent clavicle, and that the pad used was the ordinary rubber bandage.

In the second case a conical graduated pad, suggested by Parkes, of Chicago, who applied the bandage himself in the manner suggested by Keen, was used. It enabled him to carry to a successful issue an operation for the relief of an immense traumatic aneurism of the axillary space, following a laceration of the axillary artery by a bullet from a heavy 45-calibre revolver. After the application of the rubber band he laid the aneurism open,

cleaned out all the clots, found a large tear in the artery, and applied a ligature above and below it without the patient losing any blood. Twelve hours after the operation circulation was so far restored in the limb as to make a successful termination almost certain. He attributes the ease and readiness in which the difficult procedure was accomplished to the perfect control of the circulation permitted by the adoption of this plan, and believes that if an amputation at the shoulder-joint had been required it could have been done without the loss of a drachm of blood. The application of the bandage in this case enabled him to work deliberately and with perfect ease. No motion on the patient's part could displace it. He thinks the character of the pad used, under the bandage and over the artery, has much to do with the success of the method. This pad should be somewhat in the nature of a graduated compress: small enough at its apex to fit into the interval between the clavicle and the first rib, and yet thick enough and firm enough to reach well above the clavicle along the side of the neck, so as to take all the pressure off the rubber. To answer this purpose, Keen had made a wooden pad,—with its top beveled, for the purpose of enabling the rubber bandage to hold it in place and prevent its slipping either inward or outward. There are two holes at the sides and end for a removable handle resembling a two-pronged fork, with which to hold it while applying it. Keen tried a similar but larger pad for the iliac arteries, but so far its experimental use has not been satisfactory.

Merriwether, of Asheville, ⁹⁶_{Sept.} ascribes, in great part, a rapid recovery following ligation of the subclavian artery, in a case of aneurism of the subclavian involving the innominate, to the strict antiseptic measures employed.

Brachiocephalic Trunk.—Le Dentu, ⁶⁴⁸_{Oct. 14}, ²²_{Oct. 21} at a meeting of the Surgical Society of Paris, related the case of a man of 34, who came to him in May last for a tumor occupying the right side of the neck, extending down to the subclavicular fossa; pulsation was present, and synchronous with the pulse at the wrist. The skin covering the tumor was red and œdematous, but no symptoms of phlegmon were present. The first piece of the sternum, the first rib, and the clavicle were destroyed. The diagnosis was made as that of aneurism of the primary carotid and the subclavicular arteries, both of which he tied; the carotid immediately

beneath the bifurcation, and the subclavicular outside the scaleni muscles. The ligatures were tightened only as much as was necessary to interrupt the circulation. The immediate results were the cessation of the pulse in the radial and temporal arteries and a cardiac crethism, which, however, was controlled by sulphonal given in 20-grain (1.3 grammes) doses. The respiration remained normal, and although there was a slight cerebral manifestation it quickly disappeared. However, at the end of the thirty-fifth day the tumor increased rapidly in size and was accompanied by intolerable pain, and the man quickly succumbed. Caselli⁵⁸⁹_{July} reports gradual decrease in size and disappearance of all attending symptoms, as following Macewen's operation in a case of aneurism of the brachiocephalic trunk.

Radial.—Shepherd²⁸²_{Aug.} exhibited before the Montreal Medico-Chirurgical Society, June 26th, a portion of the radial artery, which showed a small punctured wound, the result of a stab. The patient had had the injury attended to in the country. A week later a pulsating tumor had appeared at the bend of the elbow, which his medical attendant had tried to cure by compression. When he entered the hospital it was about the size of the two fists, and filled the whole of the space below the bend of the elbow.

Shepherd opened the sac, and turned out the blood-clot and a thick layer of fibrin; beneath this was noticed a small hole, which, on further dissection, proved to be in the radial artery, which was ligatured above and below, and the injured portion removed.

Abdominal.—Ridley-Bailey²_{July 11} read notes before the Staffordshire Branch of the British Medical Association, May 27th, on a case of aneurism of the abdominal aorta which caused death by rupture into the stomach. There was an attack of hæmorrhage three days before the one which proved fatal. A clot probably formed and plugged the opening, until it was displaced on the occasion of the subsequent hæmorrhage; this disproved the view held by some that in aortic aneurism no preliminary hæmorrhage took place, but that the rupture of the sac occurred suddenly, followed at once by bleeding and death. He emphasized the great danger of the administration of ergot in aneurisms,—a danger which was greatest in cases where the walls of the sac were more

than ordinarily attenuated, or where the tendency to atheroma was marked.

Femoral.—Pereira-Guimaraès, of Rio Janeiro,⁵⁵ describes a case of aneurism of the right femoral artery in a laborer 53 years of age. The aneurismal sac having been removed and the cut ends tied above and below, violent hæmorrhage, surging from one venous and three arterial openings, followed the removal of the Esmarch bandage. It then became necessary to ligate the deep femoral artery with its two circumflex branches, and the deep femoral vein on a level with its anastomosis with the femoral. The cure of the aneurism was not only complete, but the limb resumed all its functions. A case of successful ligation of the femoral artery for aneurism of that vessel is reported by Ransohoff, of Cincinnati.⁵⁸
May 2

Clement Lucas²²_{Sept. 16} tied the left superficial femoral of a man aged 41. The patient suffered from double popliteal aneurism, and had been admitted to the hospital about five weeks before, having suffered for three weeks previously with pain and swelling in the ankles, together with a difficulty in moving the knees. After this he had noticed swellings in both the popliteal spaces, though he complained of the right more than of the left. The man was a dock-laborer, and accustomed to great physical exertion. The predisposing cause of the disease was probably syphilis, the man having an eruption on the arm, which was considered tertiary, and which was disappearing under iodide of potassium. The exciting cause was the hard work which his employment necessitated. A double aortic bruit could be heard over the heart, pointing to an atheromatous condition of the aortic valves, this condition having probably the same predisposing and exciting causes. The aneurismal swellings could easily be emptied, and, as it was evident that they contained very little clot, he decided to tie the femorals.

About three weeks before he had secured the right femoral with catgut, and the result had been most successful, the aneurism having consolidated and been reduced to the size of a walnut, being to all intents and purposes quite cured. On the present occasion the left femoral was quickly secured through a small opening in the sheath, the edges of which were afterward carefully placed in apposition, two pairs of dissecting-forceps being used. The skin-

incision was then accurately brought together with silver sutures placed rather deeply, their points of entry and exit being perhaps an inch from the wound; no drainage-tube was used, none being necessary, as the operator pointed out, when there was no bleeding nor effusion in the cellular tissue. The carbolic spray was not used, but the wound, during the operation, was constantly irrigated with a carbolic solution. C. S. Briggs¹²⁰ reports a case of traumatic aneurism of the femoral artery in Hunter's canal, the

BEACH'S COMPRESSION APPARATUS.
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result of a gunshot wound. Ligation of the artery was followed by gangrene. Amputation was resorted to, and the case ended in recovery.

H. H. A. Beach, of Boston,¹²¹ reviews the subject of compression in the treatment of aneurism, and describes a new appliance which has proved very successful in his hands in cases of aneurism uncomplicated with other diseases. The apparatus consists of a steel base, measuring eight by nine and a half inches, and uprights on each side, measuring nine and a half inches. The latter are continuous beneath the base, and for stability are

firmly riveted to it. Each upright supports a steel rod of one-fourth inch in diameter. Upon the rods slides a light, but firm carriage, which can be fixed at any point by a thumb-screw. The carriage is perforated in its centre, and drilled to receive a screw of three-eighths inch in diameter, carrying four threads to the inch and measuring seven inches in length. It is fitted at the top with a thumb-piece, and at its bottom with a small rubber water-bag, measuring an inch and a half in diameter. It is easy to understand that, with the aid of carefully folded sheets and towels, the apparatus can be adjusted to a thigh of any size, and the pressure adapted to the requirements of the case. By unscrewing the nuts at the ends of the rods the screw and the pad can be quickly removed to permit the adjustment of the thigh with the greatest comfort to the patient. As to the durability of the water-pad, the inventor has used it a number of years in the treatment of hernial tumors, and has never known one to rupture, even after long service.

Popliteal.—Our corresponding editor, Semeleder, of Mexico, reports a case of diffuse popliteal aneurism, described by Egea,¹⁷⁹ following a gunshot wound of the knee-joint. Ligature of the femoral artery was followed by recovery. A policeman 30 years old entered the hospital on September 12th. He had a wound on the external aspect of the left knee-joint, with circular, contused edges, twelve millimetres (one-half inch) in diameter; synovial fluid was escaping. The bullet had gone around, wounding the popliteal artery, and was felt on the posterior part of the internal condyle. The aneurism grew rapidly, and measured finally sixteen centimetres vertically. The circumference of the knee-joint was forty centimetres. A compression-bandage was applied. On September 22d the swelling was red and hot; pulsation was every day more distinctly felt; ulceration and hæmorrhage seemed imminent. A ligature was applied in the middle third of the femoral artery. The circulation was re-established on October 2d, and the temperature and sensibility of the leg were found to be normal. The bullet was easily extracted, and the operation-wound was almost entirely cicatrized. On October 26th (thirty-fourth day) the ligature came away.

R. D. Motherstone¹⁸⁷ reports a case of diffuse traumatic popliteal aneurism occurring in a laborer aged 45. The history indi-

cates that the original swelling had probably been an enlarged semimembranosus bursa; this was tapped twice successfully. On the third occasion the needle appears to have inflicted a slight wound on the popliteal artery, which must have closed, there being doubtless very little extravasation at the time. On the patient resuming work the recent cicatrix must have given way, and a large quantity of blood poured out into the popliteal space through the small longitudinal rent found. The walls were soft and friable. The vessel was completely divided and both ends were tied, obtaining, notwithstanding the slight additional risk entailed, final success.

A case of aneurism of the right popliteal artery, of four years' standing, was cured by F. S. Dennis⁹⁹ by means of compression with an Esmarch bandage for an hour and a half under ether. Some two years afterward an aneurism of the left iliac artery developed, and more recently the sac seemed to have burst, producing enormous distension of the limb, the swelling extending down to below the knee. Amputation at the hip-joint and laparotomy followed by ligature of the iliac artery were measures under consideration.

Tibial.—A case of circumscribed traumatic aneurism of the tibial artery is reported by H. J. Williams, of Macon.²⁰⁷ The patient, two weeks after a gunshot wound of the calf, noticed a soft swelling immediately at the seat of injury, which rapidly grew and became resisting. Pressure proving ineffectual, Williams ligated the femoral at Hunter's canal. Complete recovery ensued.

ARTERIO-VENOUS LESIONS.

Upper Extremity.—Panas⁸ read a report before the Paris Academy of Medicine on a case of arterio-venous aneurism of the internal carotid in the cavernous sinus, in which digital pressure on the common trunk had proved unavailing. Ligation of the common carotid was then resorted to. Nissen, of Halle,^{2051; 90} reports a case of cure of an arterio-venous aneurism of the carotid and the cavernous sinus. The patient received a thrust in the region of the right upper eyelid with the prong of a potato-fork. Swelling and extravasation of blood into the eyelids followed, with prominence of the eyeball, headache, and vomiting. At the end of seven weeks one could notice prominence of the other eye. Exam-

ination in the middle of February revealed the following condition: Bilateral exophthalmos, the right eye being more prominent than the left; conjunctival and pericorneal vessels enlarged and congested; choked disc in the right eye, in the left enlargement of the retinal veins; paralysis of both sixth nerves. Over the whole head, but especially loud in the region of the right eye, one could hear a strong systolic bruit; digital compression of both carotids almost caused this to disappear. No pulsation and thrill observable in the right eye. From these signs the diagnosis of a rupture of the carotid artery into the cavernous sinus was diagnosed. As treatment, the right common carotid was tied, and then strong compression, lasting a minute and continued for fourteen days, was put on the left common carotid artery. At the end of this time the bruit had almost disappeared; in seven weeks the bruit had entirely disappeared; left exophthalmos entirely, the right almost entirely disappeared; the left sixth nerve quite normal, the right slightly affected; a slight amount of optic neuritis still present in the right eye, left normal. In the discussion which followed the reading of this paper Wölfler (Graz) mentioned a similar case in a woman of 40, in whom a cure was effected by compression of the carotid for eight days.

E. Wolff, of Königsberg, ²²⁶_{v. 41, p. 524} describes the case of a patient who, fifteen years before, had received a stab wound of the arm. The limb, including the hand, gradually increased in size, and so remained. Very rapid cure followed extirpation of the arterio-venous aneurismal sac. The interesting points in the case were the total absence of the lower portion of the vessels involved (although slight remains of it might have been removed during the dissection) and the absence of aneurismal bruit, which, according to Bramann, invariably accompanies arterio-venous aneurism.

Inferior Extremity.—D. Avelino Barrera ⁴⁵⁹_{Aug.} reviews the subject of extirpation of the arterial and arterio-venous aneurismal sacs of the limbs, and reports 2 cases ending in complete recovery. He considers this operation (Purmann's) especially effective nowadays, antiseptic measures having relieved it of the majority of its drawbacks.

Pascale, corresponding editor, of Naples, ⁶⁷³_{Jan.} communicates the report, by D'Antona, of Naples, of a case of supposed arterio-venous aneurism of the femoral artery in Scarpa's triangle. In the opening

of the sac he found some villiform vegetations in the small perforation of the artery (at the point of communication with the sac) and small fibrinous bodies floating loose in the sac. These two conditions were the cause of a loud-continued arterio-venous murmur, which was heard before the operation. In the examination, however, a communication between the artery and the vein was found.

Reclus²² read a paper before the Société de Chirurgie on the treatment of arterio-venous aneurism by extirpation. A man aged 28, while sharpening his reaping-hook let it fall upon his left leg, the calf of which was severely wounded by the accident, and the hæmorrhage abundant. Pressure-forceps were applied and the flow of blood was arrested, but at the end of a fortnight all the signs of an aneurism were present. Compression, direct and indirect, having been applied for several days without any result, except that of causing great pain, active intervention was decided upon. Esmarch's bandage was rolled around the limb previous to the operation, and, when all was ready, the operator cut down on the vessels and tied them below the aneurism, which was then dissected from below upward. The patient was quite well in three weeks.

B. Farquhar Curtis⁵ has contributed a valuable article on the treatment of arterio-venous aneurisms, and relates 2 cases which were treated by excision. He concludes: Compression is only suitable for cases which are seen early and in which the affected vessels lie superficially. If it is not successful at once, or if its employment is difficult or painful, the risks of operation are not sufficiently great to warrant delay. In his opinion all these cases should be treated by operation, with the single exception of the cases involving the internal jugular or requiring ligature of the common femoral artery and vein. It does not appear necessary to distinguish between aneurismal varix and varicose aneurism. As to treatment, the choice of methods depends upon the size and situation of the aneurism. In a general way, it may be said that all small aneurisms, not involving the larger vessels of a limb, should be extirpated, unless important nerves are jeopardized by the dissection, or, as on the face, where it is important not to leave a scar. The treatment selected for larger aneurisms depends upon their situation. Those of the neck which involve the external jugular vein will rarely require treatment, but, should it be necessary, such cases are best treated by double ligation of both vessels. In other

situations the simple ligature of the vessels should not be chosen, for it will, in most cases, require as much dissection as will incision or extirpation, while not giving the same immunity from relapse. The surgeon should make an incision down upon the sac in its entire length, and attempt to dissect it from its bed. If this prove difficult or impossible because of inflammatory thickening or intimate connection with important parts, the sac should be incised, for it is often easier to secure the vessels when the sac is freely opened. The sac could then be left entirely in place or it could be partly removed. Suture and simple drainage of the sac have been found sufficient, and it is unnecessary to resort to packing. The recently introduced suture of veins and the successful experimental suture of arteries may alter our methods of treatment in some of these cases, Bassini having already cured a case by double ligature of the artery and suture of the opening in the vein. A very complete literature of cases is appended.

VENOUS SYSTEM.

Upper Extremities.—Osler⁷⁶⁴_{No. 11} reports a case of obstruction of the superior vena cava. The neck was much enlarged and the cervical glands hard, while the groups in the anterior and posterior cervical triangles were uniformly enlarged. The manubrium was prominent and the superficial thoracic veins very distinct. There was great enlargement of the epigastric veins; those of the right side more than those of the left. Some of the branches were as large as the little finger. Beneath the skin of the anterior part bunches of enlarged veins could be felt. There was marked tenderness on deep pressure on the manubrium, but no pulsation. The sternal notch was obliterated. Expansion of the chest was equal; apex-beat not visible, not palpable. On percussion the entire manubrium was dull, and there was defective resonance on the left side in the infra-scapular and mammary regions, as low as the nipple and as far out as the nipple line. On the right side percussion was clear. Posteriorly there was no definite dullness in the interscapular region; bases are clear. On auscultation, heart-sounds well heard; no murmur. Respiratory murmur very feeble and distant in left infra-clavicular and mammary regions. Behind, very much feebler on the left side than on the right, with a few râles on deep inspiration. The radials were equal. There was no lividity of

the hands. Examination of the abdominal organs negative. A remarkable reduction in the size of the tumors was obtained by means of Fowler's solution, in increasing doses. The patient had lately been taking as much as 15 minims (1 gramme) three times daily.

Muselier ⁵⁵_{July 11} reported a case of spontaneous venous obliteration in the left arm. Great tumefaction of the limb ensued, but no pain was experienced at first. Then followed gradual stiffening and œdema, the latter extending as far as the upper third of the arm, where a constriction, presenting the aspect of a bracelet, gave a very clear indication of the seat of obstruction. At the seat of constriction and above it the skin was very red and mottled, dilatation of the venules of the skin being marked, while all the venous trunks up to the shoulder presented signs of great engorgement. Below the constriction the veins could hardly be detected, and became completely lost toward the wrist. Bandaging gradually restored the limb to its normal state, although the patient still experienced a sensation of cold in the parts.

A case of extensive congenital varicosity of the inferior venous system is interestingly described by Derville, of Lille, ²²⁰_{Sept. 28} who ascribes the condition to deficient development of the inferior vena cava. The colored plate shown herewith gives a clear idea of the general appearance of the patient. The mass in the left groin, on a level with Scarpa's triangle, is an enormous varix, which could easily be mistaken for crural hernia.

Interesting in this connection is the case reported by Ducourtioux, of Dun-le-Pelletau, ²¹²_{Oct. 10} in which an ampullar dilatation of the femoral vein in the crural canal became the cause of death, when pressure was exercised on it by the hospital surgeon, who suspected crural hernia, of which many of the symptoms were present. The immediate cause of death was double pulmonary emboli.

William Taylor, of Edinburgh, ³⁶_{June} records very successful results by the successive application of blisters along the course of the vessel. The following are the details of the procedure: "I first ascertain, and, if possible, remove the cause. I then prescribe such remedial measures as obviate a tendency to renewal of the cause. Third, I place the patient recumbent, with the affected part elevated on pillows, for twenty-four hours, or such

Varicose Veins (Derville)
Journal des Sciences Médicales de Lille

period as may be necessary to enable the limb to regain as nearly as possible its normal calibre. I then blister from the foot or sound part of the vein upward along its course,—say, six inches daily,—always watching for the first symptom of disturbance in kidney or bladder. This does not occur so readily as one would expect from the proximity of the blistering agent to the surface of the veins. This may probably arise from these having in a great measure lost their absorbing power, or from the suction necessary to absorption being absent. Still, the bladder does sometimes become affected, and when this occurs we must suspend operations for a day or two. Certain of the blistering liquids contain camphor, and this is said to prevent strangury.

“In order to make sure of this safeguard, it is well to begin by a coating of Rubini’s tincture, allowing it a minute or two to dry, and then applying the blistering liquid over it, with which it amalgamates. When the blistering liquid has had a minute or two to dry, I apply a coating of flexile collodion. This serves the double purpose of preventing evaporation and contracting the skin over the vein, and does not prevent, but rather aids the action of the blister. The blister *must* rise and the serum be withdrawn, but the action of the blister continues for days after, so long as any redness remains. The rising of the blister is useful, in a secondary way, because the pain connected with it tends to reconcile the patient to the recumbent posture, which is absolutely necessary to success. When the whole of the affected vein has undergone blistering, the part should be carefully strapped with strips of adhesive plaster two or three inches wide. This gently stimulates the whole surface of the leg, and assists the veins to resume their suspended functions. When the plaster begins to pucker, it should be renewed and fresh strips applied. Two weeks after the strapping has been applied it may be removed and the veins tested by placing the patient in the erect position. If the vein bulges anywhere, that part should be again blistered and the process renewed. If not, fresh strapping should be applied, and the patient allowed to take gentle exercise for a couple of weeks, when the leg should be again examined and the strapping renewed. Sometimes, if the avocations of the patient compel him to walk earlier than is indicated, a solid coating of collodion over the affected surface may advantageously take the place of

strapping. Thereafter, with renewed precautions as to avoiding any probable cause of obstruction, we may take leave of our patient, with the parting advice that he should daily practice walking on tiptoe until he acquires the habit of putting the toes down first. This saves the vein from the distending effects caused by the checked momentum of the contained column of blood which results from the jerk of placing the heel down first."

ORAL AND FACIAL SURGERY.

By RUDOLPH MATAS, M.D.,

NEW ORLEANS, LA.

JAWS.

Fractures.—Among the more notable contributions of the year on this subject is a paper on fracture and diastasis of the superior maxillæ and upper bones of the face, treated by the aid of the interdental splint and cranial support, with 3 cases in illustration, by John S. Marshall. ^{2000 805}_{Aug.; Mar.} The author reviews the literature of the subject and tabulates reported cases. He states that in any severe case there must be considerable difficulty in maintaining the position of the fractured and dislocated bones when the older methods of treatment are adopted, and it is nearly impossible in those cases in which all the teeth were lost prior to the accident; for it is a well-known fact that, as a rule, edentulous jaws do not come in contact, and, if they should, a normal occlusion would not be obtained, nor the injured parts prevented from slipping out of position. In his cases he was compelled to devise some other means,—one which would maintain the position of the fractured bone and, at the same time, leave the lower jaw free, so that the mouth could be open for the purpose of breathing. This was accomplished by adopting the principal of the Kingsley interdental splint to the upper jaw, and supporting it from the cranium. Impressions of the upper and lower teeth were taken in modeling compound, by first molding it on the upper teeth, and, while it was yet soft, forcing the lower jaw upward till a correct occlusion of the teeth was obtained. This impression was trimmed to the desired shape, and a one-eighth-inch steel wire was imbedded in the sides, upon a line with the ends of the teeth, and then bent backward upon itself, opposite the cuspids, and allowed to extend outside the cheek nearly to the lower border of the ear. From this was constructed a hard-rubber splint with the wires attached. The splint can be made from silver swaged over metal dies; but

(K-1)

if a metal plate is desired, the most perfect adaptation can be secured by the electro-deposit plate, and the wires be attached with solder. The splint is held in position by means of double-elastic straps attached to the wire upon each side and buckled to a close-fitting leather or net cap, re-inforced with leather laced firmly upon the head. This appliance proved very successful, as it held the bones in their proper position and permitted comfortable breathing and free movement of the lower jaw, which enabled him to talk and, after a few days, to masticate soft food. Deep indentations were left in the under side of the splint, in which the lower teeth fitted accurately, when the mouth was closed. The object of this was to furnish a sure guide to the normal position of the superior maxillæ. Without this the correctness of the adjustment of the bones could not have been verified. The importance of this, according to Marshall, cannot be overestimated. The only other treatment was good feeding and thorough irrigation of the wounds, antra, and the mouth with a 2-per-cent. solution of carbolic acid every two or three hours, until the discharges ceased, and the removal of a few spiculæ of bone from the nose and the wall of the right antrum.

Cnopf³⁴_{No. 44, 70, July 11} describes a case of spontaneous fracture of the inferior maxillary due to tubercular infiltration in a child aged 1 year and 10 months. The patient was in a debilitated condition and had a tubercular arthritis of the left elbow. The bones of the forearm and the metacarpal bones on the right side also showed evidence of disease. The general condition would not admit of operation. The child survived but a short time, and at the autopsy extensive tubercular disease of the lungs and abdominal organs was found. On examining the submaxillary bone, marked caries was found, with a fissure extending from a small cavity, where a tooth was forming across the whole width of the bone. There were four incisors and two first molars. On the left side there were a number of cheesy masses containing bacilli in large numbers. It was evidently a tuberculous disease of the bone, the supernumerary teeth causing irritation and inflammation, which, under the circumstances, took the tubercular form.

J. D. Patterson⁸⁰⁵ reports an interesting case of fracture of the lower maxilla by a gunshot wound, treated by means of an interdental splint-bridge. As this case illustrates the benefits of pro-

thetic dentistry in a class of cases which are regarded as most troublesome to medical practitioners, we will quote the author extensively:—

“The patient was struck on the lower maxilla by a ball (from a Winchester rifle, presumably), and the anterior part of the maxilla from the second bicuspid upon the right to the second molar upon the left side shattered. Shortly after the fight such surgical care as was possible was given the case. The loose teeth and parts of the alveolar process and bone below, which were entirely loose, were removed, and the wound in the lips and cheek stitched together. It was thought possible at first that there might

FIG. 1.—PATTERSON'S CASE OF FRACTURE OF LOWER MAXILLA TREATED BY AN INTER-DENTAL SPLINT-BRIDGE.

Space from *a* to *b* corresponds to space where bone is completely absent.
(*Dental Cosmos*.)

be union between the remaining partially detached fragments, but gradually piece after piece came away, until at a point in the region of the right cuspid, for the space of about six lines, the bone (Fig. 1, *a b*) was entirely gone, leaving the remaining posterior parts freely movable.

“Six weeks after the injury the patient presented the following condition: The outside wounds had healed with considerable cicatricial tissue; the left fragment of the maxilla was easily movable, and an abscess was discharging freely upon the face opposite the loose end, with another abscess opening under the chin, near the symphysis; the left side of the jaw was much firmer than the right, but had healed far inside—about half an inch—from the

normal position. There was still considerable swelling, and small spiculæ of bone frequently made their way to the surface. The lower jaw was, of course, entirely useless, and was kept tightly bandaged to the upper. The first treatment instituted was as follows: A bridge-splint placed upon the parts as presented would result in retaining the incorrect position of the left side, and that pressure brought to bear to force the pieces apart would result in still greater deformity, because the more easily movable right fragment would give way, leaving the left in its former position. The first step, then, was (if possible) to remedy the distorted position of the left side. I proceeded as follows: I banded the first lower molar upon the right side, and also the first upper molar upon the same side, attaching lugs to the bands for the reception of a screw, and firmly screwed them together. I then placed a jack-screw upon these molars on the palatal side and against the molar on the

left side, and forced that side into its correct position, which had been determined by models beforehand. I then banded the upper and lower teeth upon this side as upon the other, and screwed them firmly together. At the end of three months the patient returned.

FIG. 2.—INTERDENTAL SPLINT-BRIDGE USED
IN ABOVE CASE.
(Dental Cosmos.)

He reported himself as very comfortable, save that he was limited entirely to soft food.

"The splint-bridge shown in the cut (Fig. 2) was then made. No details are necessary in describing this to any experienced bridge-workman. It is a splint as well as bridge. In restoring the contour of the lower lip and lost portion of jaw, rubber is vulcanized to the bridge. It has been worn for six months, and the patient, whom I saw four weeks ago, says he is a new man, and his appearance holds the statement true. He eats solid foods with comfort, and the splint-bridge is a success."

A lecture on fracture of the lower jaw, by Thomas,⁷⁸¹ is worthy of reference as an *exposé* of classical procedures.

Occlusion of Jaws.—Ollier, of Lyons,²¹¹ reports a case of osseous ankylosis of the temporo-maxillary articulation. The patient, a female aged 16 years, had scarlatina at 8 years of age,

which was followed by an abscess in the left temporo-molar region. On admission to Ollier's clinic the jaws could be separated (between incisors) a distance of 3 millimetres. Under an anæsthetic the interval could be increased to 4 millimetres. After trying the classical methods of gradual and forced dilatation, Ollier operated. A horizontal incision a few millimetres below and parallel with the zygoma was made, followed by a vertical incision 3 centimetres in length, thus making a T-incision. The ascending temporo-facial divisions of the seventh nerve were then sought for and protected by retractors. This conservative treatment of the seventh nerve is regarded as most important by Ollier. After exposing the nerve the joint was seen to be in a state of complete osseous ankylosis, which necessitated a resection of the condyle involving 25 millimetres of this bone. As the coronoid process of the jaw appeared to interfere with the lowering of the jaw, it was also excised. After this procedure the jaw could be separated 4 centimetres. The operative sequelæ were very simple and favorable. A slight paresis of the orbicular muscles was noticed in consequence of the stretching of the nerve, but this disappeared in a short time. Three days after this operation the teeth were separated 25 millimetres, but Ollier believed that the patient would do better by increased exercise and the use of dilators.

Hederich, of Mulhouse,¹⁶⁸ also reports a case of resection of the temporo-maxillary articulation for the correction of osseous ankylosis. The patient, a male aged 11 years, when 5 years of age fell on his chin and developed an arthritis in both temporo-maxillary joints, which terminated in a complete inability to separate the teeth; so that from his fifth year the boy has been nourished solely on liquid food. Even under chloroform the jaws could not be separated one millimetre. Hederich operated by resecting both temporo-maxillary joints. These were exposed by a cross-shaped incision, due care being taken to protect the facial nerve and internal maxillary artery. With the chisel-gouge and hammer, a fragment of bone was removed on each side, the size of a small nut, which represented a part of the condyle of the lower jaw and of the zygomatic process of the temporal bone. The wounds completely healed in ten days. Fifteen days after the operation the patient was discharged from the hospital, being able to separate the incisors two and one-half to three centimetres. The

same improved condition of affairs was confirmed five months after the operation.

Le Dentu, Paris,³ reports a case of cicatricial (?) ankylosis of the jaw in consequence of mono-lateral periostitis. In this case the masseter was detached from the maxilla on the affected side and, as this was not sufficient, several strong adhesions between the buccal mucous membrane and the anterior border of the ascending ramus were separated. To prevent the effects of secondary cicatricial recontraction, a unilateral gag (Mathieu's) was constantly worn for twelve days after operation; this was then followed by the introduction of wedges of wood, placed by the patient herself. The jaws were absolutely closed when treatment began; since the operation the patient opens her mouth two and one-half centimetres. Penrose, of Philadelphia,⁹ reports another case of ankylosis of the temporo-maxillary articulation following rheumatic arthritis. The patient, male, 28 years old, had already been operated by excision of the right condyle of the lower jaw, which had been followed by temporary benefit. When seen at Penrose's clinic, a blade of a pen-knife could not be inserted between the set teeth. By means of a T-shaped incision, the right temporo-maxillary joint was exposed. There was a complete bony union between the neck of the lower jaw and the temporal bone, and no condyle was discovered. A small trephine was applied to the centre of the ramus immediately below the sigmoid notch, and a button of bone was removed. The bridges of bone on each side of this opening were divided by a chisel. As, notwithstanding this division of the right ramus, it was found impossible to open the mouth, a similar incision was made upon the left cheek. The left joint was then found ankylosed. A portion of the neck, one-third of an inch in thickness, was then removed with the aid of a chain-saw. As there appeared to be some contraction of the temporal muscle which prevented the opening of the mouth, the attachment of this muscle to the coronoid process was divided. After this it was easy to separate the teeth a distance of more than one inch. Union *per primam* took place. Seven days after the operation all the dressings were removed, and the patient was able to eat the ordinary hospital diet, which included beefsteak of the average toughness. As the jaws became stiff in the morning in consequence of the adhesions formed at night, the patient was

made to use a rubber wedge, varying in thickness from one-half to one inch, to place between the teeth on retiring. Three weeks after the operation, he was etherized and the mouth forcibly opened to the fullest extent, in order to break through adhesions. He continued to use the rubber wedge for four months longer. Six months after, he could open his jaws three-fourths of an inch and could eat comfortably.

Cabot, of Boston,⁸⁹ reported 3 cases in which he had done cuneiform osteotomy for ankylosis of the jaw. The patients were aged 32, 27, and 7 years, respectively. In 2 of them the conditions followed a blow on the chin. In the other case it was the consequence of an otitis, the result of scarlet fever. In the 2 adult cases the disease had existed for from twenty to twenty-five years, while in the child it had been but a little over a year's standing at the time of the operation. In the child, the condyle was fixed in the socket by bony ankylosis, while in the 2 adults the upper end of the jaw, including the condyloid and coronoid processes, was changed into a mass of bone, and was welded to the base of the skull; so that in these 2 cases the bone to be chiseled through was very wide and thick. The incision used was a horizontal one, just below the zygoma, with a vertical one down over the neck of the jaw when more room was necessary. The scar that was left was very slight, and in 2 of the cases almost invisible. In none of them was there any paralysis of the facial nerve. The motion of the jaw was excellent in all of the cases shown. In the adult, however, the lower jaw was relatively undeveloped, so that the apposition of the teeth in the front of the mouth was not perfect. The contrast in this respect between these cases and that of the boy, in whom the operation had been done within a year of the establishment of the ankylosis, showed the great advantage of an early operation.

Cabot said that the patients shown were the last 3 out of 6 that he had operated upon for this deformity. The results in the other 3 cases, not shown, were better than in the 2 adults exhibited. In regard to the operation, the chief danger lay in the chance of strangulation during etherization, for the fixed condition of the jaw prevents access to the tongue to pull it forward if it should fall back in the mouth. In one of the adults this accident happened, and a hasty tracheotomy became necessary. After the

tube was in the trachea the separation of the jaw was effected more easily and quickly than usual. The after-treatment consisted in keeping the chiseled surfaces of bone widely separated by means of a cork between the teeth, thus allowing the soft parts to heal across and interpose fibrous tissue in the desired joint. Cabot said that he thought this operation, done with ocular inspection of the condition to be remedied, was better than any of the operations done through the mouth. The only objection lay in the scar left by the outside operation, and he had brought the present cases partly to show how slight this scar was under anti-septic healing.

Abbe, of New York,⁵⁹_{Dec. 29, '90} presented a young man aged 21, who, when 2 years of age, had scarlatina with suppurative otitis, which resulted in ankylosis of the jaw. He came to him when 10 years old. The jaw seemed completely ankylosed on the left side; possibly slight motion on the right. He then performed Humphrey's operation, cutting down on the left side, exposing the carotid artery and facial nerve, and removing the neck of the condyle. There was paralysis of the facial nerve for a short time, but the wound healed, and very good motion was obtained and had remained permanent.

Halsted, of Baltimore,⁷⁶⁴_{Dec., '90} reports a very interesting case, in which the correction of a cicatricial ankylosis (*ankylosis spuria mandibulæ*) in a boy aged 14, resulting from mercurial stomatitis, was attempted by the transplantation of a piece of mucous membrane, removed fresh from the mouth of a dog on an adjoining table. The boy had been operated upon several times without success. When he presented himself to Halsted for treatment he could not open his mouth wide enough to admit a goose-quill. Four days prior to presenting the case to the Johns Hopkins Hospital Society, he operated as follows: The skin of the cheek was divided back to the anterior edge of the masseter muscle. A jaw speculum was introduced and forced open, as the adhesions between the alveolar borders were divided. The jaws were then opened wide enough to easily admit a cork about 3.5 centimetres deep between the incisor teeth. The fornix of the V-shaped gap in the cheek and a small portion of both alveolar borders were then covered by mucous membrane taken fresh from the mouth of a dog on an adjoining table.

Rogers, of Memphis,⁸⁴⁹ reports a cicatricial ankylosis, in a boy aged 9 years, due to a sloughing stomatitis during a spell of fever, for which calomel was probably administered. A strong fibrous band on the inner side of the left cheek could be felt. The patient was anæsthetized and the band severed; the lower jaw was pried open until a space of one and one-half inches was obtained between the front teeth. The alveolus on left lower jaw was necrosed for a distance of two inches; this was removed. The patient came from under anæsthesia, and readily opened his mouth. It was explained that, on the following day, a wedge-shaped rubber pad would be placed between the teeth and kept there until the healing process was finished. Another successful resection of the neck of the condyle of the jaw, for permanent occlusion of the jaws, is reported by P. Jemoli.⁸⁸⁶
June 18

Tumors of the Jaws.—W. L. Munro,¹ reports a case of supposed sarcoma of the upper jaw, which proved to be an enchondroma. The history of the case (a female aged 76 years) readily justifies the original diagnosis of malignant disease. Operation had been discouraged by the hospital staff, but after three years of observation the author concluded that the growth was benign and operated (without anæsthetics), obtaining a complete recovery.

H. B. Robinson² reported 2 rare cases to the London Pathological Society. The first was a *columnar carcinoma of the lower jaw*. The patient, a male aged 49, had sustained, ten weeks before admission, a severe blow on the right side of the lower jaw, causing a little bleeding into the mouth, but no wound of skin. The second case was a *spindle-celled carcinoma of the upper jaw*, removed from a man aged 55. It had been growing about two years. Recurrence has taken place since the operation. The interest in these cases centres in the rare histological condition.

At the New York Surgical Society, Pilcher,¹ presented a man, 53 years of age, who had, some sixteen years ago, noticed a small tumor growing beneath the left jaw. It was at that time considered to be an enlarged lymphatic gland. It increased slowly until about three years ago, when its growth became rapid, and it developed to the size of the man's head. Last August there were signs of the tumor breaking down, and the speaker operated and found no difficulty in shelling it out. He supposed that he was dealing with

a benign fibro-cystic growth. The wounds healed kindly. A few weeks after, however, the patient was brought to the speaker with a recurrence at the site of the wound, which gave evidence of being malignant in character. The patient was then subjected to another operation, and the affected parts, together with an enlarged gland from beneath the sterno-cleido-mastoid muscle, were removed. Skin transplantation after the method of Thiersch, was done. Shortly after this a second recurrence was noticed. The growth was treated with chloride-of-zinc paste, and the usual methods for bringing about cicatrization were kept up until the whole had healed. The pathologist had, after examination of the second growth, reported that it was a typical epithelioma. The patient's recovery had been retarded by a very severe attack of erysipelas.

Dentigerous Cysts.—Several papers have been contributed on this subject during the year, which demonstrate that the interesting pathogenesis of these cystomata is being vigorously investigated and elucidated by pathologists. Among these we would mention a "Contribution on Maxillary Cysts Connected with the Teeth," by Ludwig Hektoen, ²³¹_{Jan.}, ⁷⁷⁹_{Jan.} in which two specimens of proliferating follicular dentigerous cystomata of the lower jaw are carefully described and the literature of the subject is analyzed.

The treatment of the simple variety is, according to Hektoen, obviously plain and efficacious,—namely, to incise the cyst as early and as thoroughly as possible, remove the impacted rudimentary or fully-grown tooth, scrape away the epithelial lining, and pack the cavity with suitable material. In some instances it may become necessary to remove part of the jaw and of the cyst-wall, in order to gain access to the cavity. Many surgeons advise that such operations be done, as frequently as possible, from within the mouth. While surgeons have erred in making too aggressive operations in case of simple dentigerous cyst, error has also been committed in treating proliferating cystomata ineffectively, subjecting the patient to many operations, each with its risk, where the correct one would be enough. Thus, Syme narrates a case of such a tumor in the lower jaw in a woman, on whom he operated three times by incision into the cyst, each time with only temporary benefit. Five years after the first operation, he was obliged to remove one-half of the mandible. It is plain that when such proliferating cystomata have reached a considerable size it will be

impossible to incise all the small cysts—some of them microscopic—any one of which, if left unopened, would go on proliferating. Koenig consequently advises exsection in all cases of proliferating cystomata of any size. As already indicated, the surgeon should regard the incision into a supposed simple cyst as exploratory, because a differential diagnosis between a simple and a proliferating cyst, particularly in the early period of growth, cannot be made without direct inspection; and the surgeon should also prepare the patient, and be himself prepared, for the more severe operation, in case the growth should be a multilocular one. In fact, it would seem to be a good plan, as suggested by McLane Tiffany, in all cases of operation upon tumors of the maxillæ, to incise the tumor first, in order to be absolutely certain that mistake in diagnosis may not result in an unnecessarily severe and disfiguring operation.

Charles Audry, of Lyons,²¹¹ reports a very carefully studied case of multilocular dentigerous cyst of the lower jaw which serves as the text for the author's remarks on the recurrence of maxillary cysts. The patient, a female aged 44 years, apparently had had a normal dentition. At the age of 20 she suffered with violent neuralgic pains, which were especially felt in the lower jaw. With the date of this neuralgia began the destruction of the molars, which, becoming carious, were eliminated in fragments and without pain. Six years before admission she sustained a severe blow over the lower jaw. A few days after she felt acute pain along the path of the right inferior dental, and noticed the development of a tumor, about the size of a small nut, which occupied the external surface of the anterior portion of the right ramus maxillæ. This tumor, which at first was indolent, rapidly grew to much larger proportions and caused very intense pain. The patient then entered the service of Mollière, where the cyst was freely incised, curetted, and tamponed. The tumor rapidly returned. It was punctured several times and two fistulous tracts formed. She was finally operated on by Ollier, who resected "the middle portion of the maxilla," and cut well into the healthy bone, away from the disease. The examination of the specimen revealed that the whole thickness of the diseased jaw was infiltrated with a great number of cysts, which varied in size from a pin's head to a small nut. The microscopical examination, which is most thoroughly detailed

and cannot be too highly praised, demonstrated the epitheliomatous origin of the cysts and their positive connection with the enamel organ. This observation is, therefore, especially interesting, because it positively confirms the first investigations of Folkson and Malassez as to the adamantine origin of many of the maxillary cysts. Such complete histological demonstrations being also rare in literature, this report must rank with similar careful studies by Heath and Doran, Eve and Parker, Albarran and Trélat. The epithelial origin of these multilocular and proliferating cystomata invests them with a certain degree of malignancy which is expressed clinically in their reproduction *in loco* and in their *generalization* as proved by the recorded observations of Heath, Eve and Parker, etc. In view of these facts the author concludes that in these cases it is incumbent upon the surgeon to operate with a liberal hand in order to insure the complete extirpation of the diseased area.

A valuable contribution on the development of cystic tumors of the lower jaw was read by A. Kruse, of Greifswald,⁶⁹ at the sixty-third meeting of German Naturalists and Physicians, in which the histology of these cysts was very carefully discussed. He reports 3 cases representing different stages in development and exhibiting, histologically, as many corresponding stages in the development of the enamel organ. Kruse considers the origin of these cysts to be from the paradental epithelial *débris* of Malassez.

A. W. W. Baker¹⁶ gives an account of a cyst about the size of a small pea which was found attached to the palatine root of an upper molar tooth. It presented an unusual peculiarity in being lined with columnar ciliated epithelium, the occurrence of such epithelium being accounted for by the fact that masses of epithelium are frequently seen in the root-membrane of teeth, and are thought to be the remains or *débris* of the enamel organ, the development of the cilia being a subsequent process. The cyst gave rise to a good deal of pain, and its contents were semi-purulent. The communication is illustrated with microscopic sections and photographs.

Redier,²²⁶ reports 2 cases of tooth-root cysts (*kystes périostiques*, Magitot) which were complicated by considerable primary hæmorrhage. In one case the cyst was removed from the lower and in the other from the upper jaw. In both instances the

hæmorrhage could not be controlled by tamponing with an antipyrin tampon or the thermo-cautery. Forcipressure in one case and ligation of bleeding vessels in the other were the only means of arresting the bleeding, which appeared to come from enlarged arteries that supplied the cyst-walls. Rogers, of Memphis, ⁷⁴_{May} also reports a dentigerous cyst (simple), due to a misplaced incisor, which was also an adventitious cyst. "The cavity was emptied with a curette and on its floor posteriorly was felt a projection, which, on removal, proved to be an incisor tooth growing up directly under the second molar."

Operations on Jaws.—The value of the thermo-cautery knife in the resection of the upper jaw is the subject of a paper by Faucon. ²²⁰_{Oct. 28} The disagreeable impressions which had lingered in the author's mind, after a very bloody resection which he had witnessed in earlier years, led to his substitution of the thermo-cautery for the knife in making the intra-buccal incisions needed to liberate the maxilla. The results were very satisfactory. On the other hand, F. Lange, ¹_{Feb. 7} advocates the preliminary ligation of both external carotids as a hæmostatic prophylactic. Lange presented to the New York Surgical Society 2 patients,—a man and a woman, between 50 and 60 years of age,—upon whom this operation had been performed six and five weeks before. The external incision over the maxilla had been chosen, as devised by von Langenbeck, the cuts being made along the margo-infra-orbitalis and the side of the nose, around the ala nasi, and through the middle line of the upper lip. By the preliminary ligation of the external carotids the loss of blood, which, in these operations, was justly dreaded, had been greatly diminished. They had been finished with ease, and with the possibility of distinguishing the tissues which had to be removed. Only toward the ethmoid bone, which in one of the cases had to be removed almost entirely, was the bleeding of any significance. In this case the involucrum palati duri was preserved and united to the cheek. In the other case the operation had to be extended over the middle line and a part of the vomer and soft palate, including the os palatinum, removed, on account of the tendency to development of the tumor toward the mouth.

For the ligation of the external carotid Lange found, after having tried varied processes, the following method the best: A

slightly-curved incision was made, beginning at the angle of the jaw, directed downward and with its convexity backward, so that the posterior border of the submaxillary gland became visible; here the external maxillary artery (facial) was easily found, and along it the operator worked backward to its origin from the external carotid. It was advisable to tie the external maxillary and to use the ligature for pulling on the vessel, in order to make out with certainty its origin from the carotid, above which it was ligatured. In one case the speaker had severed the belly of the digastricus in order to obtain easier access, but, as a rule, this would not be necessary. He had found this way better than to go from the bifurcation upward. Here the branches were the most numerous, and it was not at all easy to distinguish, in the depths of the wound between the lingual, the superior thyroid and the external maxillary. On the other hand, it might be desirable to ligate distally to the origin of the lingual arteries, since a sufficient re-establishment of circulation in the tongue to prevent necrosis might not be quite certain in elderly persons.

In both the cases Lange observed that in one of the wounds on the neck slight necrosis of connective tissue took place without much suppuration, and in the case of the woman, who was anæmic before the operation, a similar necrosis of the skin. The large incisions on the face had essentially healed by first intention. On account of the necessity of removing the floor of the orbit in both cases, the eyeball had slightly sunk downward and double sight had resulted. This was very annoying to the patients in the beginning, but they gradually became accustomed to it and learned to suppress one of the images, if they did not stand too close together. In looking downward no disturbance was noticed.

Charles McBurney, in the discussion, said that for the very great majority of cases he could not acknowledge the necessity of the ligature suggested as a preliminary to the removal of the superior maxilla. The hæmorrhage was principally confined to a short period immediately following the removal of the mass of the tumor, and was really quite easily controlled by pressure. This work was, of course, to be in the hands of an assistant,—and a good one,—but, when properly done, it was sufficiently effective to enable the surgeon to proceed safely with the remainder of the work. Lewis A. Stimson said that he had removed both superior

maxillæ simultaneously, without preliminary ligation and with very little bleeding, though the patient had died from the operation. Lange remarked that all the cases of this operation which he had seen had been attended with considerable hæmorrhage. He did not see how it could be otherwise. He did not know what incisions were chosen by those who were able to do the operation without a great deal of bleeding, and who maintained that the hæmorrhage would not be important. He thought that the indications for sparing as much blood as possible in these cases was quite evident. Some of these sarcomata bled so profusely that there was hardly any operation in surgery attended with such loss of blood.

McBurney said he should not like it to go on record that he too lightly appreciated the loss of blood in these cases. He was aware that in some kinds of tumors, such, for instance, as the angeio-sarcomata, it was likely to be quite great. He had, however, operated on a great many, and in some of the cases the bleeding had been profuse, but it had been easy to control it by skillfully-applied pressure, as he had stated. Pressure should be applied to the bleeding surfaces with sponges held in long-handled forceps. J. A. Wyeth said that the ligation of both carotid arteries would, of course, theoretically, control the hæmorrhage from this class of tumors; still, in one instance, in which he had tied them both, the hæmorrhage had been frightful. He then cut out the bones and removed the tumor, burned the parts, and packed the cavity with sponges. The wound was kept open for eight months. There had been no recurrence. He insisted that the danger of hæmorrhage in removal of the upper jaw had been greatly exaggerated. If the patient was placed on the side on which the jaw was to be removed, even without lowering the head in the least, the blood would run harmlessly out from the mouth and not into the larynx. R. F. Weir said that, in the main, he supported Lange's views on this subject. A few years ago he had lost 2 such cases from severe hæmorrhage. He had then made up his mind that it would be expedient to put a temporary ligature, at least, on the external carotids. He did not think, however, that in the majority of cases this would be necessary; still, he felt that the hæmorrhage met with after such a preliminary operation would be more easily managed. In doing the operation without this

precaution the bleeding took place from so many points that it was often impossible to get the forceps on fast enough. It was his custom to direct his assistant to make pressure upon the facial and angular arteries, and in this way considerable loss of blood was avoided.

A case of resection of the lower jaw in which a prothetic apparatus (artificial jaw) was applied immediately after operation is reported by Gangolphe.²¹¹ In the course of the operation the characteristic whistling sound indicative of entrance of air into the veins was heard, but was not followed by any perceptible effect on the patient,

In a case of epithelioma of the lower jaw, in a man aged 58, Mynter¹⁷⁰ operated as follows: After preliminary tracheotomy, and after having plugged the pharynx with a large sponge, he split the lower lip and chin to the hyoid bone, dissected the healthy tissues away, and severed the lower jaw with a chain-saw near both angles. Then, turning the severed jaw downward, he removed with scissors the whole cancerous mass, including the lower surface of the tongue and both submaxillary glands. The skin-flaps were then sutured, with the exception of an opening near the hyoid bone, through which a drainage-tube was introduced. The tracheal tube was removed on the twelfth day, the patient being then able to breathe through the mouth. He was nourished for four weeks with the stomach-tube, but is now able to swallow quite well; although the rest of the tongue, by cicatricial retraction, is firmly drawn down to the floor of the mouth. His long face has been changed into an oval one, so that his best friends would scarcely recognize him. He has gained greatly in weight and strength, is free from pain, and able to live with comparative comfort.

In a case of malignant growth (epithelioma) involving the hard and soft palate, anterior pillar of fauces just extending to the edge of the tongue, Spencer²² first performed laryngotomy, and then plugged the pharynx with a sponge to which a strong silk thread was attached; an incision was made vertically through the upper lip into the left anterior nares, and the cheek separated from the alveolar process of the upper jaw by the knife and elevator; this part of the jaw was then divided, in a line horizontally from the nose outward, below the malar bone and through

the hard palate, a saw and large bone-forceps being used. After the removal of the alveolar process the part of the growth which still remained was snipped off, with scissors, from the anterior pillar of the fauces and from the side of the tongue. The actual cautery was used to stop hæmorrhage from the bone and to touch the soft parts covering the ramus of the lower jaw, where no very wide margin beyond the growth could be obtained. The cavity was packed with iodoform gauze, the lip united by horsehair, and the laryngotomy-tube was removed.

A case in which the superior and two-fifths of the inferior maxillary and the malar bone with parotid gland on left side were removed is reported by T. E. Potter.⁸⁵⁶ The removal of these parts was necessitated by an injury caused by the discharge of a heavily-loaded gun, which plowed away almost half of the patient's face, the work of the surgeon here being simply to remove the exposed and partially-attached fragments.

Necrosis.—A case of necrosis of the maxilla in a child of 4 years is reported by Lempert⁸²⁷ following measles. The affection began with a catarrhal condition of the stomach; ulceration set in, and afterward periostitis, which brought on maxillary necrosis. Johnson⁶¹ also reports 3 cases.

Fusci⁵⁸⁹ reports a case of phosphorous necrosis of the left superior maxilla, in which the necrosed jaw was successfully removed by subperiosteal and intra-buccal operation.

SALIVARY GLANDS.

Calculi.—O. Tross⁷⁶⁸ describes the case of a locksmith, 38 years old, who had a walnut-sized tumor on the floor of the oral cavity. On palpation, one drop of pus issued from a point-like opening on the cupola of the tumor. Incision with scalpel evacuated a limited quantity of fetid pus. Next day a salivary calculus was pushed out spontaneously,—a second and third being afterward removed with forceps. A complete recovery ensued in two days.

The three stones laid together were more than four centimetres long, at the thickest place three-fourths centimetre thick, pointed in front and rear; the surface granular. The most interesting feature was the facet formation. As in joints, the stones lay closely,—touching each other. Klebs and Waldeyer believe that

masses of microbes are the most common cause of such stones, the phosphates and carbonates of lime, magnesia, and soda, etc., being deposited around them; others maintain that they owe their existence to foreign bodies which have penetrated through the ducts. In a short appendix to the article, Arnold points out the great scarcity of such faceted stones. Several cases of calculus in Wharton's duct are reported by Lavrentieff¹¹_{July} and Hutchinson.²⁸²_{Feb.}

Salivary Fistula.—Agnew¹¹²_{July} recommends the following procedure for the cure of salivary fistula connected with Stenson's duct, regarding it as effective as it is simple:—

“Everting the cheek with the thumb on the inside and the fingers on the outside, a curved needle armed with a silk thread is carried beneath and around the duct, a short distance posterior to where it opens into the mouth, both the entrance and exit of the needle being on the mucous surface of the mouth, and not deep enough to reach the integument of the cheek. The needle is now detached from the thread, and the ends of the latter, after being tied together, are brought out of the corner of the mouth and secured to the outside of the face by a strip of adhesive plaster. As the thread ulcerates its way through the included tissues, the duct is separated from the cheek, causing the saliva to flow into the mouth, and is quickly followed by closure of the fistulous orifice on the cheek.”

Shelly¹¹²_{Sept.} reports a case of chronic salivary fistula resulting from opening a parotid abscess. The patient was a boy of 5½ years. By improving the general health with tonics, spontaneous recovery took place.

Tumors of the Salivary Glands.—A submaxillary composite cartilaginous tumor arising from the submaxillary gland is reported by Weir.¹_{Feb.} The tumor was as large as a tangerine orange, and had existed below the jaw eleven years. Its growth had progressed slowly and without much pain. It could be felt in the mouth close to the bicuspid teeth, and through an incision there two salivary calculi as large as peas were removed. After a delay of several months without any subsidence of the growth, he enucleated the tumor with the idea that it was the result of an obstructed salivary gland. It was found attached to the edge of the submaxillary gland, and was a composite cartilaginous growth similar to those commonly met with in the parotid region. A

sarcoma of the submaxillary gland is reported by Dubreuil.²⁹⁸¹
The interest of the case centres in the pathological report, in which
a very careful histological description of the tumor, which the
author calls "a hard, alveolar, perithelial sarcoma," is given.

TEETH.

Pathology.—In a paper on the rheumatic and gouty diathesis, as manifested in disease of the peridental membrane, John S. Marshall⁶¹_{Oct. 17} takes a positive stand in favor of the diathetic origin of many forms of peridental inflammation, and urges the practical advantages to be derived by treating the constitutional dyscrasia as well as the local condition. Some of the more interesting illustrations and opinions on reflex expressions of carious disease of teeth are reviewed by W. A. Dickinson.¹⁰⁷_{June} Walson²²¹_{Oct.} reports a case in which facial palsy was apparently caused by the extraction of a second bicuspid and second molar. There was facial hemi-anæsthesia and hemiplegia on the side corresponding to the tooth extraction immediately after awakening from the anæsthesia (nitrous oxide). The paralysis had not been relieved six months after the extraction. This is probably a case of cerebral lesion developed during the anæsthesia, and simply coincident with the extraction.

Operative Dentistry.—B. J. Richardson,⁶_{Jan. 24} in a paper on hæmorrhage after tooth extraction, read before the Odontological Society of Great Britain, ascribes the comparative rarity of hæmorrhage following the extraction of a tooth, in recent years, to modern improvements in dental instruments, especially the abandonment of the "key," the greater surgical knowledge possessed by dentists generally, and to the fact that the hæmorrhagic diathesis is greatly reduced. There are three distinct conditions leading to dangerous hæmorrhage: (1) abnormal fluidity of blood—purpuric hæmorrhage; (2) deficient contractile power of the divided vessels—vascular hæmorrhage; (3) mechanical lesion favoring the flow of blood—mechanical hæmorrhage. In the purpuric class there is generally a history of hereditary predisposition; the blood is abnormally fluid (due to excess of water), and does not coagulate when taken from the body; and purpuric eruptions, present or past, though not a constant symptom, are a very frequent one. In other cases the extreme fluidity of the blood is caused by excess of soluble saline material, such as has been observed on a

large scale in scurvy produced by too long a subsistence on food preserved by salt. Vascular hæmorrhage is due to the want of contractile power of the blood-vessels. The subjects are persons of enfeebled constitutional and nervous type, showing relaxed circulation in sudden blushing and suffusion of the face; or they are anæmic, alcoholic, or the victims of specific degeneration. Mechanical hæmorrhage is due to accidents connected with the extraction of a tooth, such as fracture of the alveolus. In the treatment of hæmorrhage of the second and third classes, styptics with pressure are most immediately useful, the best being tannin and perchloride of iron, either of which may be applied by means of a plug of gutta-percha. In purpuric hæmorrhage, should ordinary styptics fail, coagulation must be induced by the electric or actual cautery, which is allowed to cool down to a temperature just below redness; and, applied with care, gives little pain. In all cases, alcoholic stimulation is unadvisable, as it acts after the manner of a salt in destroying the coagulating power of the blood, and, what is more serious, increases the heart's action.

Editorial comments,⁸⁴⁰ in connection with the paper of J. F. W. Silk,⁸⁰⁰ read before the Odontological Society of Great Britain, show that the general opinion was not such as to encourage the adoption of Nunneley's anæsthetic—bromide of ethyl—among English dentists. Silk was not able to state a very strong case in its favor, his appendix showing that, in a rather large number of cases, more or less untoward symptoms followed its use. However, some of these were hardly test cases, inasmuch as Silk had adopted a better method in the later ones. The surgeons who operated upon patients under the bromide did not find it satisfactory, as there seemed to be some doubt as to when the patient was "under," and the after-sickness, as with chloroform and ether, struck them as placing the anæsthetic behind nitrous oxide. The anæsthetists, although several of them had not tried bromide of ethyl in dental practice, spoke strongly against its use; and if, as was urged by Dudley Buxton, its action is physiologically that of chloroform, its employment in dentistry must be open to the objections usually advanced against that substance.

Anæsthetics in Dentistry.—V. Haderup, of Copenhagen,⁸⁷⁵ Jan. 24, Feb. 1 has administered bromide of ethyl 250 times. The average quantity required to produce complete resolution and destroy the

corneal reflex is 12 grammes ($2\frac{7}{10}$ drachms). One of the greatest advantages of the agent is its rapid action. Anæsthesia is obtained in from twenty-two to ninety seconds, but it lasts an equally short space of time, unless the patient is re-anæsthetized, when it may be prolonged ten minutes.

A death in a dentist's chair from cocaine injections is reported.⁸⁰⁷
Sept. 25, '90 The patient, a woman aged 29, was apparently perfectly healthy, but very nervous. The extraction was painless, and nothing abnormal was noted. The operator withdrew from the patient's chair to get some water for the patient to rinse her mouth with, and, on his return, found her motionless. Physicians were summoned and artificial respiration was practiced, but without success. The quantity of cocaine in each injection was 2 centigrammes ($\frac{1}{8}$ grain). It would appear not to be safe to inject a larger quantity than $\frac{1}{2}$ or $\frac{3}{4}$ grain (0.032 to 0.049 gramme), especially into very vascular tissues, where absorption is likely to be rapid.

Two warning cases are reported from France.²²
Nov. 5, '90 In one of them, which occurred at Lille, the patient died, and the dentist who gave the injection was acquitted of neglect, but condemned for practicing medicine without qualification. In the other case, which occurred at Paris, the patient was with great difficulty brought round by hypodermatic injections of ether. The cocaine injection was also made in this case by a dentist.

Hallopeau⁸⁰⁵
Mar. reported to the Académie de Médecine a case of chronic cocainism induced by a single injection into the gum of 8 centigrammes ($\frac{2}{7}$ grain) of hydrochlorate of cocaine. From a study of this case, he believes the following conclusions to be authorized: "A single injection of cocaine, even in a small dose, may not only produce immediate toxic symptoms of a grave character, but may give rise to symptoms persisting for several months. These distant symptoms are analogous to those perceived sometimes immediately after the injection, viz., obstinate headache, insomnia, numbness of the extremities, attacks of faintness, dizziness, prostration, loquacity, and a state of great agitation. These accidents are chiefly observed in very excitable subjects."

Reclus,⁸¹
Mar. who employs cocaine largely, endeavors to controvert these statements of Hallopeau, and asserts that, properly managed, this valuable anæsthetic is innocuous. The rules to be

followed in the management of this drug are, according to Reclus, as follow: 1. The quantity of cocaine injected should never exceed 12 centigrammes ($1\frac{1}{2}$ grains), 2, 4, 6, or, exceptionally, 8 centigrammes ($\frac{2}{7}$, $\frac{3}{8}$, $\frac{9}{10}$, $1\frac{1}{4}$ grains) sufficing for most minor operations. 2. A weak solution (2-per-cent.) should be employed. 3. The introduction of the drug into the interior of a blood-vessel should be avoided. The best way to prevent the evil consequences of such a contretemps is to push the needle into the tissue slowly, and, while so doing, to press on the piston-rod at the same rate. In this manner, even if a vessel be pierced, only a small proportion of the solution can mingle with the blood contained in the wounded vessel. Reclus, who has practiced over 1100 cocaine injections,⁷⁸¹ does not believe that cocaine is so frequently responsible for the untoward symptoms attributed to its local administration. His work, while mainly related to general surgical practice, is of considerable interest to the dental practitioner. He believes that, in the immense majority of cases, the pallor and tendency to syncope are really of emotional rather than toxic origin. We all know that some people faint at the sight of the lancet. He cites the case of a lady who desired that a dentist should extract an aching tooth, but begged him to inject cocaine as a preliminary; she only added, as a warning: "I am sure that if the cocaine is injected I shall die from it." To relieve himself of this embarrassing situation, the dentist filled a hypodermatic syringe with distilled water and injected it about the tooth; the same instant the patient fell back in syncope. Verneuil relates a curious case. One day he was preparing to perform tracheotomy. The patient was ready on the table. He made a gesture with the knife, as if about to begin the incision; that instant the patient became pale, and died in syncope. If he had injected cocaine, there is no doubt that the drug would have been incriminated.

Among other valuable papers on anæsthetics may be mentioned the following: "Removal of the Pulp by the Use of Cocaine," by Edw. C. Briggs⁸⁰⁸_{May}; "Chemistry, Physiology, and Pathology of Nitrous Oxide," by S. J. Hayes, with editorial comments⁸⁰⁹_{May}; "Nitrous Oxide as Viewed from a Practical Standpoint," by John D. Thomas.⁸⁰⁵_{Nov.}

Antiseptics in Dentistry.—W. D. Miller, of Berlin,⁸⁰⁵_{July} says:

“There is no department of surgery in which the demand for antiseptic procedure is more urgent than dentistry, for the reason that all our operations are performed upon septic or infected tissues, and we have no means of rendering the territory to be operated upon aseptic except by the use of antiseptics of the highest character. We cannot extract a tooth, cleanse the canal of a pulpless tooth, excavate a cavity of decay, or lance the gums—we cannot even touch any point in the oral cavity—without our instrument becoming coated with a layer of infectious material. We are, therefore, bound to use antiseptics, not only for the purpose of disinfecting the already infected tissues, but also for sterilizing our instruments, to avoid the transmission of infectious matter from one patient to another.”

The author details the dangers of infection from septic instruments, and concludes that: 1. The napkins are best sterilized by boiling in soap-water for ten or fifteen minutes. 2. Coffer rubber-dams should not be used twice; when, however, the necessity exists for repeatedly using the same piece of rubber-dam, immersion in *boiling* water from six to fifteen minutes is the only sterilizer. 3. Drinking- or rinsing- glasses and instruments should be sterilized by the same process. After numerous experiments with all the known disinfectants, including carbolic acid, lysol, trichlor. phenol, sublimate, peroxide of hydrogen, absolute alcohol, etc., the author concludes that none are reliable or practicable in dental practice, and must be subordinated entirely to boiling water. He says: “I have found boiling water to accomplish in two minutes as much as chemical agents, ordinarily used, in half an hour.” He regards an exposure of three minutes to boiling water sufficient for sterilizing smaller dental instruments, —*i.e.*, excavators, etc.,—unless they are particularly dirty; whereas forceps should be exposed five minutes. In agreement with the results obtained by Schimmelbusch and Behring, the author has found that 1-per-cent. or 2-per-cent. boiling solution of carbonate of sodium has a slightly stronger action than water alone. Its chief advantage, as pointed out by the first-named author, lies in the fact that the rusting which is liable to occur when the instruments are boiled in water is avoided by the addition of soda; consequently, an exposure of three to five minutes to a boiling 1-per-cent. or 2-per-cent. solution of soda is recommended. Of course,

the water should be boiling, and not simply hot. The sterilization of teeth for transplantation and implantation is also best effected by these means.

The consequences of septic extraction are reviewed by W. Baker,⁷⁸¹ who, adopting the views of Miller, demonstrates that maxillary septic osteomyelitis and pyæmia may follow extraction in consequence of the contamination of the wound with pyogenic and pathogenic micro-organisms. This article, together with the masterly contribution on the subject entitled "The Human Mouth as a Focus of Infection," by Miller, of Berlin,⁸⁰⁵ Sept., Oct., Nov. should be read by all practitioners as well as dentists who are skeptics in antiseptics and operate regardless of the rules of surgical cleanliness. A mouth-wash, recommended by Miller years ago, and which is decidedly superior to the best of the many so-called antiseptic mouth-washes on the market, has the following constituents:—

| | | |
|---|-----------------------------|-------|
| R | Acidi benzoici, | 3.0 |
| | Tinct. eucalypti, | 15.0 |
| | Spts. rectific., | 100.0 |
| | Ol. menth. pip., | 0.75 |

For the last year Miller has been making experiments with saccharin, which manifests a very considerable action upon the bacteria of the mouth. It appears also to be one of the least poisonous of the substances recommended for the treatment of the oral cavity, and has no deleterious action upon the teeth. Its greatest drawback is its intense sweetness, which, to some persons, renders it very unpleasant. It is not, however, the sweetness of sugar, saccharin not belonging at all to the sugars or even to the carbohydrates, being chemically an anhydride of a sulpho-benzoic acid. He has employed it in the following form:—

| | | |
|---|-----------------------------|-------|
| R | Saccharini, | 2.5 |
| | Acidi benzoici, | 3.0 |
| | Tinct. ratanhiaæ, | 15.0 |
| | Spts. abs., | 100.0 |
| | Ol. menth. pip., | 0.50 |
| | Ol. cinnam., | 0.50 |

Three parts of this to twenty-seven parts of water, kept in the mouth a full minute, has a very marked effect upon the number of living bacteria in the mouth. If, instead of water, a 4-per-cent. solution of peroxide of hydrogen is used in connection with the tincture, a still more striking result is obtained. The subject of antiseptics has also been discussed by W. F. Rehfuss, of Philadelphia.⁸⁰⁶ Aug.

E. C. Kirk, of Philadelphia,⁸⁰⁵_{July} is enthusiastic in his praise of aristol, and especially recommends it in the treatment of pyorrhœa alveolaris, in 10-per-cent. solution, in oil of cinnamon. It is applied by saturating threads twisted from a wisp of absorbent cotton and cut into half-inch lengths, and gently carried, by means of a blunt probe, to the bottom of each suppurating pocket, an effort being made at the same time to encircle the root at the base of the pocket with the medicated thread. After each diseased alveolus has been so treated the case is dismissed for twenty-four hours. The results were most gratifying in the reporter's experience. The case reported was treated weekly for about ten weeks, with marked results. Aristol, in solution in essential oil, as a dressing in acute pulpitis, has its limitations; as an antiseptic, in permanent root-fillings with gutta-percha and chloroform, it is especially valuable; as an ingredient in a nerve-paste for devitalizing purposes it is ranked with iodoform. Its freedom from disagreeable odor is its chief advantage.

Among other articles on antiseptics may be mentioned one on "Creolin," by Wm. H. Potter, of Boston⁸⁰⁸_{Apr.}; "A Few Words in Regard to the Sterilization of Instruments," by Harold C. Ernst; "Dental Medicaments, with Special Reference to Antiseptics," by J. W. Jungman, of Cleveland.

Formulæ.—The following are recommended as disinfecting dentifrices:—

℞ Alcohol, 500 grammes (15 ounces).
Camphor., 10 grammes (2½ drachms).
Salicylic acid, 20 grammes (5¼ drachms).
Pulv. benzoin., 50 grammes (1¾ ounces).

M. Sig.: Two teaspoonfuls in a pint of water as mouth-wash.

℞ Essence of cloves, 100 grammes (3½ ounces).
Hypochloride of lime, 50 grammes (1¾ ounces).
Essence of anis, 20 grammes (5¼ drachms).
Glycerin, 500 grammes (20 ounces).

M. Sig: Same directions as above.

℞ Resorcin ,
Salol., āā 2 grammes (31 grains).
Elix. dentifrice, 100 grammes (3¾ drachms).

M. Sig.: Use as mouth-wash.

℞ Resorcin., 2.0 grammes (31 grains).
Salol., 4 0 grammes (62 grains).
Powdered iris-root, 40.0 grammes (1¾ ounces).
Carbonate of lime, p., 0.8 gramme (2 drachms).

M. Sig: Use as tooth-powder.

R Saccharin,
 Sod. bicarb., 1 gramme (15½ grains).
 Salicylic acid, 4 grammes (62 grains).
 Alcohol, 200 grammes (6 ounces).

M. Sig. : A few drops in a glass of water as a gargle.

R Pulv. roasted coffee, 75 grammes (2½ ounces).
 Pulv. charcoal, 25 grammes (6¼ drachms).
 Pulv. boracic acid, 25 grammes (6¼ drachms).
 Saccharin, 1.65 grammes (26 grains).
 T. vanilla mucilage, q. s.

M. Sig. : Make into lozenges weighing 0.70 gramme (12 grains) each.

Dental Obsession.—V. Galippe⁹⁴ reports three cases of the affection designated by Charcot “Obsession Dentaire”; that is, the state in which a patient is possessed by some morbid fixed idea in connection with the teeth. Case I. A woman aged 36, of neurotic descent, was prostrated with grief for many weeks following the death of her husband, vertigo, headache and insomnia being present. These symptoms disappeared after five weeks’ change of residence. An incident then occurred which proved to be the starting-point of the obsession. The patient, while having a carious tooth prepared for filling, experienced acute pain in the pulp. From that moment her mind became possessed by thoughts about the tooth; insomnia and emotional depression returned. Of the numerous dentists whom the patient consulted, none found any local disease or gave relief by the topical measures they employed. The patient by degrees became convinced that her teeth grew out of position, that the lower jaw projected on one side, etc. With a mirror in her hand she daily spent hours in scrutinizing the imaginary abnormalities. Eventually the patient rapidly improved and lost her morbid notions, under treatment prescribed by Charcot. Case II. A cultivated American, at the time of consulting Galippe, was traveling in Europe, accompanied by a dentist, whose particular function was to protect his patient from operative treatment on the part of other dentists. The obsession took its rise from the operation of stopping a bicuspid. Great pain set in and lasted intermittently until extraction was performed. The patient then became tormented by the ever-present idea that further operations would be attempted and great injury would ensue. Although the many dentists who examined him were unanimous in assuring him that there was nothing in the condition of his teeth to justify his fears, he remained constantly harassed by painful sensations in his

teeth or gums. Occasionally pain would shoot along the shoulder up to the ear. Touching the lower jaw appeared to evoke pain. Much improvement was affected by hydro- and psycho-therapeutical treatment, the obsession and pains almost disappearing. Case III. A lady who had reigned in the society of a large capital for many years experienced keenest chagrin when the time came for her to abdicate. Among other signs of age she perceived that her teeth were apparently elongated and irregularly placed. Symptoms of alveolar pyorrhœa developed, which further engrossed her thoughts. She spent a large portion of her time seeing dentists, frequently visiting one twice or thrice in one day. By insensible degrees she became compelled to compress her jaws forcibly on the plates she wore. This impulse increased to such a degree as to cause her to pace about her room ejaculating and thrusting her fingers or some foreign body between the dental arches to impede their coming in contact. This aim then became the patient's obsession; she renewed and extended her searches for professional relief, ever requiring some new apparatus to be made. The involuntary contraction of the masseters and temporals merely increased, and set in whenever anything was introduced into the mouth. Through the advice of a distinguished physician all her remaining teeth were extracted.

SELF-RETAINING SCREW-GAG.
(*British Medical Journal.*)

Aggravation of her condition resulted, and she finally drifted into profound melancholia with suicidal propensity. All these patients were predisposed to insanity. Each case shows that local treatment is futile, if not baneful. Obsessions in relation to the tongue have within the last few years been noted by certain observers. The features common to these patients have been the existence of neuropathic taint, the dread of cancer developing in the organ, with absence of objective lesion.

Self-Retaining Screw-Gag.—Alexander Morrison,² has invented a gag, illustrated by the accompanying cut, which consists of "two arms (*d*) run upon a screw (*c*) which is capable of being worked from either end by the key (*b*). The gag is thus applic-

able to either side of the head. The key, of which a separate illustration (*h*) is given, has a suitable mechanism for securing it to the end of the screw, thus enabling the whole apparatus to

1 ■ ● 4

be retained in position by tapes (*f* and *g*), applied through the handle of the key and finally secured through the ring (*e*). In order that a clenching of the jaws may not prevent the action of the screw which would otherwise take place, a smooth steel rod (*a*) is run through the levers (*d*) and relieves any such strain upon the screw. When, however, the gape is rendered sufficiently wide, the rod (*a*) is removed, and the lower lever becomes as mobile, laterally, as the jaw to which it is attached, and from which it is prevented from detaching itself by a well-made tooth-rest. In the case of a willing and conscious patient there is, of course, no necessity of the rod (*a*), as the mouth is willingly opened to the required extent and the screw worked without hindrance."

A New Form of Abscess Lancet.—J. Edward Line, of Rochester, N. Y.,⁸⁰⁵ designed the lancets here illustrated with special reference to the evacuation of deep-seated abscesses, also abscesses deep-seated or otherwise, covered with thick, leathery

A NEW FORM OF ABSCESS LANCET.
(Dental Cosmos.)

tissue, in which the lips of simple incisions close mechanically as the lancet is withdrawn, preventing the evacuation of pus. Such conditions are frequently found in the tissue covering the

hard palate, the abscess usually being traceable to lateral incisors. With one of these lancets the operator may know when he has penetrated the sac by the flow of pus through the channel in the blade, thus avoiding the necessity of a secondary incision and the pain resulting from pressure made necessary in the effort to evacuate the contents of the sac after an incision by the ordinary lancet-blade. Four forms are illustrated as those which are most generally useful. The preference will probably be given, for ordinary cases, to Nos. 1 and 3.

SURGERY OF THE FACE.

Plastic Operations.—Bardenheuer, of Cologne, ⁶⁹ contributes the reports of several cases in which the extensive defects resulting from operations for carcinoma involving the mucous membrane of

FIG. A, 1.

FIG. A, 2.

BARDENHEUER'S METHOD FOR THE PREVENTION OF CICATRICAL CLOSURE OF THE JAW.
(*Deutsche medizinische Wochenschrift*.)

the mouth and external surface of cheeks and lip are corrected, not only cosmetically, but with the view of preventing cicatricial trismus. As will be seen by the illustrations, he prefers the skin of the forehead for the purpose of laying the intra-oral foundation of this plastic operation, as it is without hair, has little fatty tissues, is well nourished, can be easily laid over the defect, and very soon assumes a mucoid appearance when turned into the mouth. The raw surface is again to be covered over by an additional pediculated flap borrowed from the infra-maxillary region. In this way the excised mucous membrane is replaced by the forehead flap,

and the skin of the cheek by that of the infra-maxillary region. The raw surfaces left on the forehead and below the jaw should be immediately closed, at the same sitting, by covering with Thiersch's grafts. In order to obtain a good cosmetic result in operations of this class, Bardenheuer considers that the correction

I

FIG. B, 1.

FIG. B, 2.

FIG. B, 3.

FIG. B, 4.

(*Deutsche medizinische Wochenschrift.*)

of the whole defect must be attempted at one sitting, the shrinking of the flaps not allowing of its performance in successive stages. The apposition of the two raw surfaces in the cheek, one representing the mucous membrane and the other the skin of the cheek, greatly increases their vitality and insures the protection of this part from the dangers of cicatricial contraction. In the first

case, Fig. A, 1, a large portion of the cheek and the whole upper and a part of the lower lip had to be removed. A large flap was lifted from the forehead, the pedicle corresponding to the inner corner of the left eye. This flap was turned over on its pedicle so that the epidermal surface looked into the mouth and the raw surface outward, as shown in Fig. A, 2. A flap was now taken from the infra-maxillary region below the chin and displaced upward so as to cover the raw surface of the forehead flap, now representing the mucous membrane of the cheek. The upper part of the defect of the forehead was then covered with grafts according to Thiersch's method, and the infra-maxillary defect corrected by suturing the

FIG. C, 1.

FIG. C, 2.

(Deutsche medizinische Wochenschrift.)

edges. Fourteen days afterward the pedicle was cut away and replaced. In the second case the operator proceeded in the same manner, Fig. B., 1 to 4, showing the successive stages of the operation. In the third case the defect in the mucous membrane of the cheek was far more extensive, as is shown in Fig. C, 1. Fearing that the usual pedicle brought down beside the nose would be insufficient for nutritive purposes, the author dissected a flap from the whole forehead down to the upper eyelid, which, together with an adjoining centimetre of skin on each side, served as a broad pedicle. The flap was then turned downward so that the skin surface looked into the mouth (Fig. C, 2). A flap from the neck was then stitched to the raw surface thus presented by the first flap (Fig.

C, 3), and at the same sitting the upper part of the defect in the forehead and the whole defect in the neck were closed by Thiersch grafts. The pedicles of all the four flaps are cut in fourteen days

FIG. C, 2.

FIG. C, 4.

and replaced in their normal situation. A modification of Bardenheuer's operation for cicatricial trismus is detailed by Erich Staffel, of Chemnitz, ⁶⁹_{Deut. 11, 70} in a very aggravated case (in a child

STAFFEL'S MODIFICATION OF BARDENHEUER'S OPERATION FOR CICATRICIAL TRISMUS
(*Deutsche medizinische Wochenschrift*.)

aged 5 years) resulting from mercurial stomatitis. In this instance the teeth could not be separated one millimetre apart. A very creditable result was obtained, nevertheless,

Congenital Elephantiasis of Face and Scalp.—The following case is reported by Coley,¹ as occurring in the practice of Wm. T. Bull: A. P., aged 16; United States; male; admitted April 12, 1890. Family history good. Patient was slightly under size, and mental development considerably below par. He had congenital hypertrophy of the face, eyelid, and scalp, confined to right side. The right eye had become diseased in early childhood, and

CONGENITAL ELEPHANTIASIS OF FACE AND SCALP.
(*New York Medical Journal.*)

had been removed. The general aspect of the face strikingly resembled that of a dog's face, and it is a curious fact that while the mother was pregnant (during the early months) she worked almost constantly for several weeks upon a "dog puzzle." He had six brothers and sisters—all well developed, both mentally and physically.

Examination showed the whole of right side of the face greatly hypertrophied, and the features distorted. The hyper-

trophy seemed to be confined chiefly to the skin and subcutaneous tissue. The right eye was absent, and the upper eyelid very greatly thickened and pendulous, reaching down to the upper of the ala nasi. There was a well-marked, irregular depression in the region of the squamous portion of right temporal bone, and in one place a slight loss of bony substance. The upper jaw showed absence of teeth on the right side, beyond the second incisor. Over the posterior portion of the right parietal bone there was a soft, flabby tumor of the scalp about the size of a small hen's egg, freely movable, and covered with a normal growth of hair.

On April 19, 1890, under ether, an incision was made just below the border of the eyelashes of the hypertrophied lid and the skin dissected up as far as the eyebrow. The redundant portion beneath was then dissected away from the conjunctival membrane, and the skin and conjunctiva sutured at the lower edge with fine silk. The tumor of the scalp was then removed by means of an elliptical incision, the wound partially closed, and the remainder left to granulate. The face was left for subsequent operation. Both wounds healed promptly, and the appearance of the eyelid was greatly improved. On May 3d, under ether, an elliptical incision was made from the angle of the mouth nearly to the ear, including the larger portion of the redundant tissue (three inches at its greatest width). The incision was carried entirely through the mucous membrane in the mouth. The edges of the mucous membrane were then sutured separately with catgut and the skin with silk sutures. The bleeding was profuse, but easily controlled. Extensive œdema and swelling followed the operation, but soon subsided on relieving the tension and applying wet antiseptic dressings. The wound healed slowly, and on June 4th the patient left the hospital markedly improved.

Prominent Ears.—Monks,⁹⁹ reports several operations for correcting the deformity due to prominent ears. The operations suggested are of two kinds; in the one the skin and cartilage are excised, and in the other the skin only. Operations by excision of skin and cartilage appear to be called for only in cases where the cartilage is stiff, and they are, therefore, applicable principally to adults. Unusual twists or turns in the cartilage causing special and unusual deformities call for special modification in the tech-

nique of operations. One should, however, before attempting any operation, bear in mind the low regenerative power of cartilage, and expect to wait patiently for the healing process to be completed. It seems almost impossible that an operation upon the cartilage can be performed which will leave no trace in the way of scar, or unnatural prominence, or depression on the outer space of the ear. These slight disfigurements, which might be called "substitution deformities," will probably grow less and less noticeable as time goes on; but they must ever be drawbacks to the success of any of these operations. In spite of them, however, in certain extreme cases of unduly prominent ears in adults, an operation upon the cartilage would seem to be justifiable, and will probably give, on the whole, very satisfactory results. In all cases the piece removed from the skin of the ear should be somewhat larger than that removed from the cartilage.

The method of excision of skin alone appears to be applicable to all cases where excision of the cartilage does not seem to be necessary. The shape of the ellipse of the skin to be removed from the back of the ear will vary to a certain extent with each case. Undue prominence of the ear at any one point should call for the resection of a specially broad piece of skin at that point. The incision to be made in the ordinary prominent ear, when the ear projects below as well as above, is shown in the figure. The stitches are represented as properly applied and ready to pull tight and knot. In cases where the ear projects particularly at the top, while the lower part is normal (and this seems to be the next frequent variety of the deformity), the resected portion should be broadest above; while in the rare variety of the deformity, where the lower part of the ear is particularly prominent, the portion resected should be close to the bottom of the sulcus, where the skin of the back of the ear joins that on the side of the head. The operation may apparently be performed in suitable cases at

MONK'S METHOD OF CORRECT-
ING THE DEFORMITY DUE TO
PROMINENT EARS.
(*Boston Med. and Surg. Journal.*)

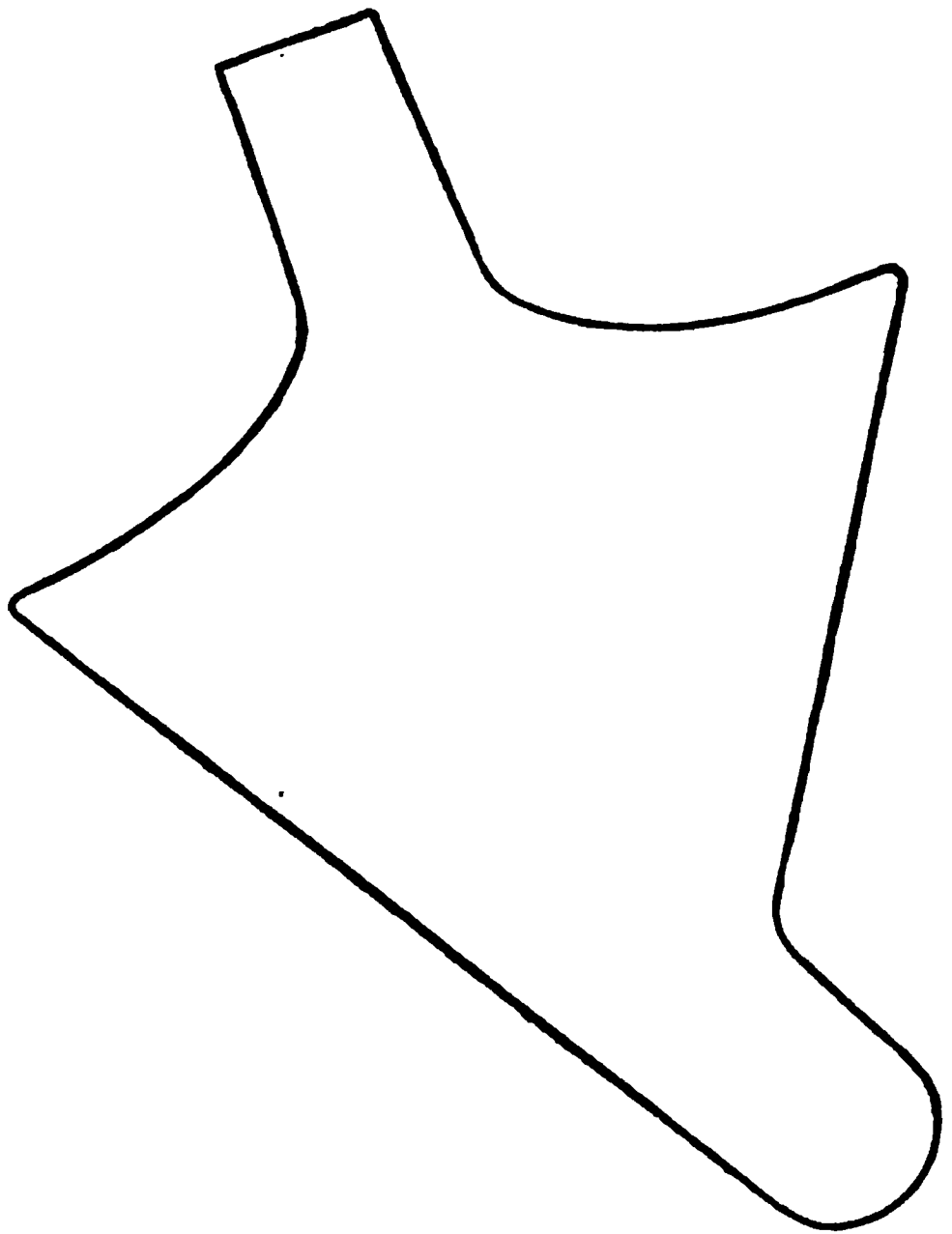
any age with success, though probably the earlier in life it is done the better will be the ultimate result. Ether is required, and the services of one good assistant. When under the anæsthetic, the patient should be turned so that the ear requiring operation is uppermost. The scalp is then covered with sheet-rubber and the field of operation cleaned with ether and corrosive sublimate. The piece of skin to be removed having been carefully mapped out, it should be dissected off. The sutures should then be inserted in such a manner that when drawn tight the deformity is satisfactorily corrected, and rather more than corrected, so that the ear lies rather flat against the head. It may be necessary, for the sake of changing the axis of the ear, to insert the stitches diagonally from one skin edge to the other. In case the operation is to be done on one side only, the two ears should be compared from time to time. When everything is satisfactory, the sutures should be tied and iodoform powder dusted along the line of incision. A temporary dressing is now to be applied in case the other ear is to be operated upon, and the patient is turned upon the other side. The operation is then done on the second ear, both ears being compared from time to time. A layer or two of iodoform gauze is placed back of each pinna, and the ears pressed firmly against the head by a bandage.

Plastic Operation for Severe Burn of Face and Neck.—Shepherd²⁸² describes the case of a patient, 20 years of age, whose chin and lower lip when he entered the hospital were fixed to the sternum, causing the whole head to be bent forward and obliterating the front of the neck. The burn had involved the greater part of the chest and also the sides of the neck and arms. The lower jaw, from the continued tension of the scar, had been pulled forward and protruded several inches beyond the upper, giving the man a hideous appearance. Several operations were performed. The neck was first freed by a dissection which reached almost from ear to ear, and when granulation had been established grafting after Thiersch's method was performed. The protruding lower jaw was then excised and the lip restored by Teale's method. The result was good; the patient's appearance was much improved and he could use his mouth.

Rhinoplasty.—Surgeon-Major Keegan^{6 Feb. 21} contributes the results of his extensive experience with the operative treatment of

facial deformities in India, where, in consequence of the criminal mutilation to which the nose is frequently subjected, the operation of rhinoplasty is in frequent demand. The author has operated during his Indian service on some forty odd cases, all of which were undertaken to repair the damage caused by mutilation. Of all the methods of rhinoplasty, the author prefers the Indian method, by borrowing a forehead flap. He has modified the operation in several particulars; he invariably cuts out a flap as outlined in figure. This is the flap in cases of complete mutilation.

“The root or pedicle should occupy the internal angle of the eye, and care should be taken that the angular artery which supplies this root be not wounded.” The forehead flap should be mapped out obliquely, not perpendicularly. When the forehead is low, Keegan does not hesitate to encroach upon the scalp to provide for a columna. In cases in which both alæ, the entire cartilage, and the columna have been cut away, the author proceeds as follows:—

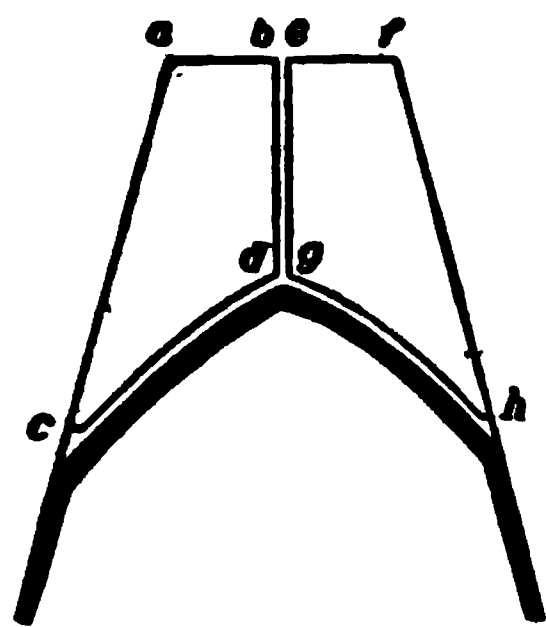


OUTLINE OF FOREHEAD FLAP.
(*London Lancet*).

The operation is begun by carrying two converging incisions from two points slightly external to the roots of the alæ nasi to two points about three-quarters of an inch apart on the bridge of the nose, where a pair of spectacles would rest. These two points are now joined by a horizontal incision, which is bisected, and a perpendicular incision drawn downward from the point of bisection nearly as far as where the nasal bones join on the cartilage of the nose. In other words, this perpendicular incision follows the course of the junction of the nasal bones, but is not carried down as far as their inferior borders. The skin and tissues are now dissected cautiously

from all the nasal bones from above downward, in two flaps, *a b c d* and *e f g h*, as in appended diagram.

The two inferior borders of the flaps *c d* and *g h* are not interfered with, and constitute the attachment of the flaps to the structures and tissues which clothe the inferior borders of the nasal bones where they join on to the cartilage of the nose. If these two flaps are reflected downward so that their raw surfaces look forward and their cuticular surfaces look backward, it will be found that they overlap in the centre. The surgeon has, therefore, a redundancy of flap to deal with, which he can utilize a little later on, when he has raised the flap from the forehead, which he does in the usual way. A piece of stout brown paper, rendered adhesive and corresponding in outline with the flap considered suitable



OUTLINE OF NASAL FLAPS
WHICH ARE REFLECTED
DOWNWARD IN KEEGAN'S
METHOD OF RHINOPLASTY.
(*London Lancet.*)

to the case in hand, is stuck firmly onto the forehead in a slanting direction, and a very sharp knife run down around the border of the paper. The paper is now removed and the flap is quickly raised from the forehead. This flap should embrace all the tissues down to the periosteum, and should be subjected to as little handling as possible. The sides of the gap left in the forehead are approximated as quickly as possible by means of horsehair sutures, and it is surprising how small a raw surface is left behind on the forehead if the approximation of the

sides of the gap be judiciously and expeditiously carried out. Attention is now directed to preparing a nidus or bed for the reception of the columna, and this does not require any description. The two flaps *a b c d* and *e f g h*, which have been already raised from off the nasal bones, are reflected downward, and, as they overlap in the centre, two triangular-shaped pieces are cut away and placed in the middle of the gap left in the forehead, in order to expedite the process of cicatrization in the frontal scar.

The forehead flap is now brought down over the nasal bones, and rests inferiorly on the two reflected flaps, *a b c d* and *e f g h*, taken from off the nasal bones. The raw surface of the frontal flap, inferiorly, lies on the raw surfaces of the two reflected nasal flaps, and the nostrils of the newly-formed nose are therefore lined

inside with the skin or cuticular sides of the reflected nasal flaps. The free inferior margins of the forehead flap and the nasal flaps are brought together by horsehair sutures. The columnar portion of the forehead flap is fixed in the bed prepared for it by sutures, and the two original incisions drawn from the root of the alæ nasi on either side to the bridge of the nose are deepened and beveled off for the reception of the sides or lateral margins of the forehead flap. The sides or lateral margins of the forehead flap are most accurately attached by means of horsehair sutures. Two pieces of drainage-tubing are inserted in the newly-formed nostrils. Strips of lint, on which some boracic ointment has been smeared, are placed over the junction of the lateral margins of the new nose to the cheeks, and also on the gap left behind on the forehead, and cotton-wool is applied over all. If the root or pedicle of the new nose is sufficiently broad, and is not dragged upon, and if the angular artery has not been wounded, all will go well, and there need be no fear of sloughing. Indeed, it will be generally found that, if due antiseptic precautions have been taken during the operation, the new nose will have adhered, to a very large extent, by first intention. A fortnight is allowed to elapse before dividing the root or pedicle of the new nose, and in doing so Keegan cuts a wedge-shaped slice out of the root, so that the new nose may not be parrot-shaped. As the inside of the nostrils are clothed with skin, the drainage-tubes may be discarded after ten days; for if the operation has been properly performed there can be no contraction of the nostrils. If the reader will bear in mind that the object of raising the flaps from off the nasal bones is to clothe the newly-formed nostrils with skin, and so counteract their tendency to contraction, which is one of the great drawbacks to success in rhinoplasty, he will be able to follow the steps of the operation. The utilization of the nasal flaps gives strength and support to the new nose and counteracts its tendency to flattening.

Meloplasty.—The most notable contribution on this subject is a paper by J. A. Karteweg, of Amsterdam.⁹⁶ The evolution of the plastic surgery of the face in connection with the correction of the deformities of the face and mouth resulting from the extirpation of malignant growths is fully dealt with, and special stress is laid upon the importance of the forgotten suggestion, originally made by Mott (1834), that, in cases requiring the extirpation of

the mouth, cheek, and corresponding buccal mucous membrane, the gap between the jaws should be allowed to cicatrize without attempting to reunite the separated edges. In this way there is no danger of immobilizing the jaws by cicatricial retraction, and modern plastic operations secondarily performed will have a better chance of success. The report is made of a case in which an enormous gap between the jaws and lips, resulting from the extirpation of an epitheliomatous ulcer of the mouth, was corrected by the transplantation of a flap from the upper lip.

LIPS.

Harelip.—A case of median harelip, associated with a median cleft of the alveolus, was reported by Clutton to the Pathological Society of London.² In this case the reporter believed that the premaxilla existed, but ununited. Sutton remarked that this was a rare instance illustrative of a want of fusion of the globular processes in the middle line. Albrecht's view was that there were two centres of ossification for each premaxilla, and that in a case like the present one the two



FIG. 1.

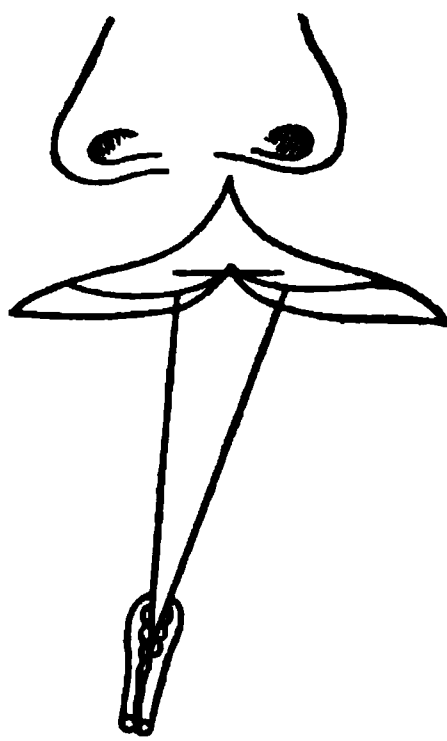


FIG. 2.

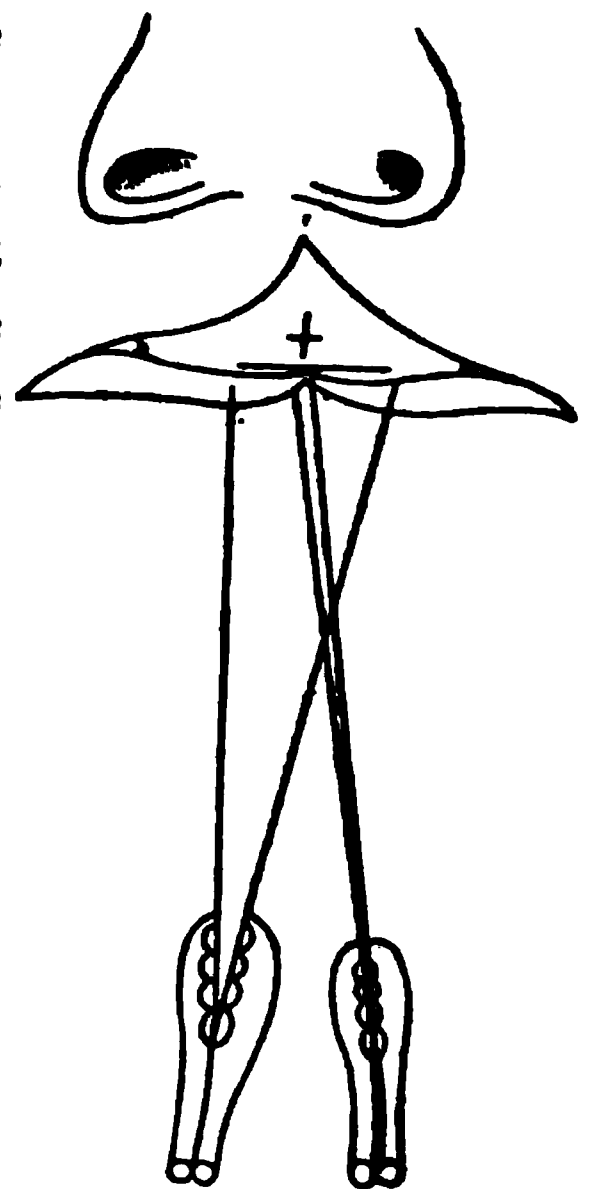


FIG. 3.

SUCCESSIVE STAGES OF FENGER'S FLAP-SPLITTING OPERATION FOR HARELIP.
(*Journal of the American Medical Association.*)

inner centres were absent. He believed that the case stood by itself.

Christian Fenger, of Chicago,⁶¹ contributes a valuable paper on a new operation for harelip. While the principle of flap-splitting which underlies this procedure is not original with Fenger (it was first applied by Maurice Collis, of Dublin, many years ago), he has so extended and perfected the application of the

principle both to partial and complete, single and double harelip that his procedure deserves to be considered as new. He states that in all cases of harelip we find not an excess, but rather a defect of labial mucous membrane, prolabium, and skin. The two portions of the upper lip, when brought together, were too small to form a lip of normal shape; it would require the interposition of a triangular flap of lip, with apex toward the nose and base toward the border of the lip, to obtain at once a



lip of normal shape. The tissue defect was greatest in the skin, less manifest in the mucous membranes and prolabium; still, in the majority of the cases of complete harelip, the defects in these tissues might be considerable. In most operations, the so-called "freshing" of the surfaces to be united required the removal of at



FIG. 4.

FIG. 5.

SUCCESSIVE STAGES OF FENGER'S FLAP-SPLITTING OPERATION FOR SINGLE HARELIP.
(*Journal of American Medical Association.*)

least a portion of the prolabium, and this led Fenger to adopt this method of operating, by which no tissue was lost. The two main points in the new operation are the incision and the prolabial sutures. The incision is linear, and similar to that made in Tait's operation for lacerated perineum. Interrupted prolabial sutures of fine silk should be employed, in sufficient numbers and at sufficient intervals to furnish exact union. These sutures made the wound, so to speak, cutaneous, instead of visceral, and prevented

infection from microbes in the mouth. The cosmetic results in the author's cases had been satisfactory. The diagram on pages 40 and 41 will elucidate the different stages of the operation.

The value of cutaneous grafts in the correction of cicatricial ectropion of the lower lip is the subject of a careful report by P. Redard.⁵⁵ He describes the case of a girl of 14, who, in consequence of extensive burns of the face, sustained when only 2 years old, presented a striking deformity of the lower lip,—an

CICATRICIAL ECTROPION OF THE LOWER LIP BEFORE OPERATION.
(Gazette Médicale de Paris.)

ectropion of the mucous membrane due to the traction of extensive cicatricial bands in the cheeks, chin, and submaxillary region. The face before operation is shown in the accompanying cut. For many and obvious reasons, the author discarded the classical procedures recommended for the restitution of the parts, and decided to adopt the method of transplantation of *solid cutaneous grafts*, as practiced by oculists for the restoration of the lids (Le Fort, Sichel, Ollier, Wolff, Stellwag), and which the author had seen successfully practiced by Abadie. A transverse incision was made

on each side of the lower lip, sufficiently deep to liberate the lip and permit it to resume its normal position. With the point of the bistoury, several cicatricial bands in the periphery of the wound were removed. By this means two raw surfaces were obtained,—one on the right, shaped like a heart, $1\frac{1}{2}$ centimetres by 1 centimetre; the left formed a triangle, was directed upward and outward, and measured a space 1 centimetre in length by $1\frac{1}{2}$ centimetres in breadth. An exact copy of these raw surfaces was

CICATRICIAL ECTROPION OF THE LOWER LIP AFTER OPERATION.
(*Gazette Médicale de Paris.*)

traced on paper, and, with these models as guides, two flaps were cut out from the anterior and inner surface of the arm, care being taken to dissect out the whole thickness of the skin, but deprived of the subcutaneous fat. These flaps were cut out a little larger than the paper models, in order to compensate for the immediate physiological retraction of the skin. The two grafts were then transplanted to the raw surfaces, which had been kept, in the meantime, in an aseptic condition. They fitted exactly, and were firmly fixed by thirty interrupted sutures, made with very fine

aseptic silk. The dressing, which was applied with moderate firmness, consisted of iodoform gauze and sublimated cotton, and was allowed to remain eight days. When the stitches were removed, about the same time, the grafts had taken well throughout their extent; a slight cuticular desquamation was noticeable, with a slight bluish discoloration in one or two points of each graft. Thirteen days afterward the parts were completely healed and the deformity greatly corrected, as shown in the cut on preceding page. Seven months after the operation, the improvement was decidedly maintained and no tendency to cicatricial recontraction was noticeable. This case proves, with many others reported by other operators, that these solid skin-grafts (Wolff's grafts) have a greater sphere of utility in plastic surgery than is generally accorded them.

Restoration of the Lower Lip After its Extirpation for Carcinoma.—E. Regnier's ²²⁶_{R. 41, H. 3} paper is based on the study of 11 cases from Wolfler's clinic, at Gratz, and aims especially at the re-introduction of a forgotten operative method, first described by Morgan, in 1829. It is a simple procedure, applicable to extensive cases, and consists in the excision of the neoplasm by a curved incision, which will remove the whole area of disease. Another curved incision, with the concavity looking upward, is made upon the jaw, or below it, according to the loss of substance to be repaired; the flap of skin thus mapped out is dissected away from the underlying parts and lifted up to the position of the original lip, which it is intended to replace, and there fixed by sutures. It is attached by two lateral pedicles, which insure its nutrition. The raw surface left by the dissection below the chin is covered by Thiersch grafts, which correct the tendency to secondary recontraction. Zartarain ²³²_{May 30} reports a successful cheiloplasty for extensive traumatism of the lower lip; and Titus Romano ²⁵⁹_{July 15} one for the correction of deformity resulting from extirpation of carcinoma of lower lip.

A successful extirpation of an epithelioma of the lower lip, in a man aged 102 years, is reported by Jalland. ²_{May 1}. The correction of extensive defects of the lower lip and skin of chin by plastic operation is illustrated by 2 successful cases by E. O. Samp-
ter. ²²⁶_{R. 41, p. 142} A case of bleeding cavernous angioma, with commencing epithelioma of the upper lip, is reported by D. W. Montgomery, of San Francisco. ⁷⁷_{Dec. 70}

A zinc-paste dressing for harelip has been recommended by Van Noorden, of Tübingen ⁷⁸¹_{B. 1, H. 2, 79} as superior to others as to simplicity, convenience, mechanical and antiseptic effect. This paste, which was first described by Socin in 1813, consists of zinc oxide, 50 parts; zinc chloride, 5 to 6 parts; water, 50 parts. It has the quality of drying in a firm crust when exposed to the air. After completing the operation, the suture line is disinfected and carefully dried. The paste, freshly prepared, is applied over the whole upper lip with a brush or spatula, with one or two very thin layers of cotton for support. If the wound extends into the nostril, the paste should cover it throughout its extent, but without blocking the nostril. It dries rapidly and forms an air-tight, firmly-adherent covering, over which the nasal secretions run without dissolving it. It is non-irritating. The dressing is changed on the fourth to sixth day for removal of sutures. If not already loose, it can be slowly cut away piecemeal with scissors. A fresh dressing is then applied, which is allowed to remain till separated spontaneously. This dressing was satisfactorily tested by Noorden in 10 cases. It was also used for small sutured wounds of the face, herniotomies, cancer of the lip, etc. G. Phocas, of Lille, ³²¹_{Oct. 16} reviews the classical features of the operative treatment of harelip, and relates 5 cases illustrating the early operation.

TONGUE.

Foreign Bodies in Tongue.—The following case, in which a tooth was lodged in the base of the tongue for several years and simulated carcinoma, is reported by Sanford. ¹¹_{July} The patient was a male aged 47. On examining the interior of the mouth, Sanford noticed that the tongue moved with great difficulty at the right side, and, on raising it, a thickened, ulcerated patch appeared at its base, on a level with the position of the last tooth. Most of the teeth were absent. The ulcerated surface was soft to the touch, but bled profusely. The whole presented an extremely malignant appearance. On searching with the finger he felt some unusually hard substance at the base of the ulcer, and with some difficulty extracted, by means of a forceps, a white, chalky body, which afterward proved to be a tooth covered with deposit, which had evidently been *in situ* for a long time, and had burrowed its way downward between the jaw and the tongue. On inquiry,

the patient informed him that he recollected having been on a severe drinking bout several years previously, shortly before his throat trouble commenced, and to have had some "disputes" with a comrade, during which the tooth, he thinks, might have been dislodged from its socket, and found a resting-place beneath the tongue. Every abnormal symptom gradually disappeared under treatment, after the removal of the cause of irritation, and in a month the patient was quite well.

The late Sir Morell Mackenzie related that he had once removed a foreign body from the throat which had been *in situ* for fourteen years. It was a pin originally about two inches long, but the piece removed was only about half an inch long, the other portion having corroded away, and the part that was left being curiously thickened in an irregular way by the action of the tissues on the metal. The patient was a lady who lived at the Cape of Good Hope. There had been many attempts made to remove the pin, all of which had been unsuccessful. It was in the right hyoid fossa, only the extremity being visible. It had been pushed almost vertically downward, along the side of the larynx, and only the small black point presented. Mackenzie managed to get hold of it and remove it, and at first a good deal of inflammation resulted. The patient ultimately went away quite well.

Delassus²²⁰ reports a case in which a fragment of a pipe was retained for five years in the tongue. Redier,²²⁰ refers to a case in which a fragment (5 cubic centimetres) of a clay pipe was extracted from the cheek, where it had produced an abscess. The patient had no idea that this large foreign body was lodged in his mouth.

A fish-bone imbedded in the base of the tongue, causing very distressing dysphagia, and which was only discovered after careful laryngological examination, and removed with prompt relief of the symptoms fourteen days after its penetration, is reported by A. McShane.¹²

Tumors of the Base of the Tongue.—Rosenberg,¹¹ before the Laryngologische Gesellschaft of Berlin, stated that hypertrophy of the glands of the base of the tongue are often observed. Sometimes the lingual tonsil is hypertrophied so as to resemble polypus. This hypertrophy is caused by scrofulosis, catarrhs, leukæmia, or syphilis. The symptoms are: difficulty in swallowing, bleedings, cough, feeling of foreign body. The treatment

consists in brushing with iodized glycerin and galvano-cautery. Retention cysts are sometimes observed in the valleculæ, and may attain the size of a nut. They may be cured by incision or destruction of the cyst-wall. Papillomata are sometimes observed and may cause neuralgic troubles; they are easy to remove by galvano-cautery. Pure and mixed fibromata, chondromata, adenomata, dermoid cysts, and thyro-dermoids are rare. Carcinomata and sarcomata of this region are rarely primary, but usually continuous with the tonsils, the tongue, and the epiglottis, and the prognosis is very unfavorable. A case of congenital sublingual lipoma is reported by Adolf Zander.⁶⁹⁶_{Dec., '90} A peasant boy aged 3 was admitted on account of a steadily increasing sublingual swelling, which had been first noticed shortly after his birth. On examination, the whole oral cavity was found to be filled up with a soft tumor the size of an apple, which was partly protruding from the mouth, carrying the tongue (in a normal condition) on its top. It was covered with a smooth and but slightly mucous membrane, traversed here and there with old scars. The lower teeth were inclined forward. The new growth was extirpated very easily, the wound rapidly healing without any complications. The tumor proved to be an encapsulated lipoma fibrosum. A case of sublingual dermoid cyst, which was mistaken for a ranula, is reported by A. Schmitt.²⁴³_{Feb.}

Operative Surgery of Tongue.—The most remarkable contribution on this subject is the report of 104 cases of entire excision of the tongue for cancer, by Walter Whitehead.⁶_{Nov.} The author states that during the last twenty years his operations upon the tongue for cancer number 139 cases. Of these, there have been 119 recoveries and 20 deaths,—a mortality of 14.3 per cent. By excluding 10 successful cases operated on with galvanic écraseur and 25 successful partial excisions, the number of his total excisions is reduced to 104, with the mortality of 20, or a percentage of 19 to 21, against 14.3 in the gross number of his cases. Furthermore, in excision of the tongue alone the author's death-rate is only 4.5 per cent., while 77, or 57 per cent., respectively, were lost when glands and jaw were involved. The following is a brief recapitulation of the special points in his procedure: (1) the patient should be completely under the influence of the anæsthetic during the first stage of the operation, but afterward only partial insensi-

bility should be maintained; (2) the mouth should be securely gagged and kept fully open throughout the operation; (3) the head should be supported in such a position that, whilst the best light is secured, the blood tends to gravitate out of the mouth rather than backward into the pharynx; (4) a firm ligature should be passed through the tip of the tongue for the purpose of traction; (5) the first step in the operation consists in dividing the reflection of mucous membrane between the tongue and the jaw and the anterior pillars of the fauces; (6) rapid separation of the anterior portion of the tongue from the floor of the mouth should be made; (7) if possible the lingual arteries should be secured with Spencer Wells's forceps prior to division; (8) a ligature should be passed through the glosso-epiglottidean fold before finally separating the tongue; (9) a mercurial solution should be applied to the floor of the mouth, and the surface painted with an iodoform styptic varnish.

Whitehead says that there is another subject in connection with cancer of the tongue which is constantly and painfully being brought to the notice of the surgeon, and that is the singular view, held by a large section of the profession, that in cases of cancer the means of relieving pain are limited by the maximum dose of any sedative authorized by the British Pharmacopœia. It is a constant experience to find that a patient suffering incessant and intolerable agony is ordered the paltry dose of 1 grain (0.065 gramme) of opium at bed-time, and it is the rare exception to find sedatives administered on lines proportionate to the amount of suffering. In contrast to this he mentions one of his own cases. A gentleman suffering from cancer arrived at the stage when he began to suffer pain, and commenced with $\frac{1}{4}$ grain (0.016 gramme) of morphia, which at first gave relief; by degrees this dose had to be increased until he eventually took as much as 30 grains (1.94 grammes) three times daily. This kept him entirely free from pain, without at any time interfering with his intellectual interest in his daily surroundings. The total amount of morphia consumed during the twelve months preceding his death amounted to 3512 grains (227.5 grammes). He also inhaled, during the last four days of his life, 5 pounds' (2160 cubic centimetres) weight of chloroform, and Whitehead believes that he would have died much sooner had not this sedative treatment been adopted from the first.

At a meeting of the Société de Chirurgie of Paris, Berger,⁸ spoke on the difficulty of disinfecting wounds of the tongue resulting from partial extirpation. Some years ago, having obtained by the thermo-cautery a clean section of that organ, he united the wound by suture. The result was very satisfactory. In a fortnight the wound was completely healed. Since then he had operated more than once for epithelioma of the tongue, and the wound healed by first intention. Quénu said that he had in 3 cases obtained a good reunion by the method advocated by his colleague. Reclus, Richelot, Marchand, and Bazy related similar successful cases.

Ligature of the Lingual Artery as a Preliminary to Partial or Complete Excision of Tongue.—At a meeting of the Royal Academy of Medicine in Ireland,² Croly strongly advocated preliminary ligature of the lingual artery in one-sided cancer of the tongue and deligation of both linguals in cases where the disease involved both sides of the tongue. He had tied fifteen lingual arteries,—six double and three single. The incision in each case was commenced beneath and external to the symphysis menti, extending downward to the great cornu of the os hyoides and upward to a point near the angle of the jaw, avoiding the facial vein. The platysma and deep fascia were divided on a director, and, when raised, the submaxillary gland was exposed, the digastric muscle, with hypoglossal nerve, forming the boundaries of a triangle in which the artery lay. The fibres of the hyoglossus thus exposed were next divided on a director, and the artery secured in its second stage. This dissection enabled the operator to explore the digastric space, and glands which could not otherwise be felt, owing to the dense cervical fascia, could be removed, thus making the operation a comparatively bloodless procedure, and giving the patient a much better chance than if the glands were not removed. Croly related cases in which he removed the tongue as far back as the epiglottis, and where, the root of the tongue being severed, there was no bleeding. He expressed the opinion that exploring thoroughly the submaxillary region was just as important in tongue cases as exploring the axilla in breast cases. Lingual arteries varied; about one in six arteries lay on, instead of beneath, the hyoglossus muscle. In ligature of both linguals, one side often was easier; the artery occasionally pierced the muscle, was some-

times large, and occasionally very small. The author condemned the Paquelin cautery as a means of excising the tongue, having seen some secondary hæmorrhage following its use.

Forcippresure in Extirpation of Tumors of the Tongue.—Péan, of Paris,¹⁰⁰ emphasizes the value of forcippresure as a hæmostatic. In extirpating the tongue, the patient is always anæsthetized and placed in the semi-recumbent posture; the jaws are separated with Mathieu's gag, and two sponges on long holders are placed deeply in the mouth, between the cheeks and teeth,

FIG. 1.—HÆMOSTATIC FORCIPPRESSURE IN EXTIRPATION OF THE TONGUE.
(*Gazette des Hôpitaux.*)

with the view of preventing the penetration of blood into the larynx. The operative technique in the application of the hæmostatic varies according to the following circumstances: (1) if the tumor is limited to part of the tongue; (2) if the disease is extensive enough to demand the complete, or almost complete, extirpation of the tongue; (3) if the floor of the mouth has been invaded by the disease from the tongue; (4) if the disease has been propagated from the tongue to the floor of the mouth and a portion of the lower maxillary.

In the first condition, a strong forceps, as shown in cut,²⁰⁸³

is placed transversely and behind the tumor; a second, longitudinally in the median line of the organ; and a third, on a level with the floor of the mouth. These forceps are applied sufficiently beyond the diseased area to allow the surgeon to cut wide of the disease. After the excision, the raw surfaces are approximated by deep silk or horsehair sutures, which act as final hæmostatics by filopressure and prevent the septic contamination of the submucous tissues by the closure of the wound. The

FIG. 2.—REUNION OF INTRA-BUCCAL WOUND AFTER EXTIRPATION OF TUMOR AND REMOVAL OF FORCEPS; THE SUTURES ASSURE HÆMOSTASIS; A SINGLE LONG FORCEPS IS ALLOWED TO REMAIN ATTACHED TO EPIGLOTTIS TO PREVENT ASPHYXIA.
(Gazette des Hôpitaux.)

forceps are removed and iodoform gauze applied. The sutures are removed in six or eight days.

In the second condition, when the whole tongue must be removed, prophylactic forcipressure is as useful as in the first condition, except that more forceps are required. At least two are applied to the base behind, two in front, and two on each side of the root of the tongue, as shown in Fig. 1. After excision, an attempt is made to secure union *per primam*, by suturing the remaining portions of mucosa to the floor of the mouth, as shown in Fig. 2.

In the third and fourth conditions, a more or less extensive portion of the inferior maxilla must be resected with the tongue and floor, as shown in Fig. 2 or 3, in which the lateral half and body of the jaw are (respectively) shown as in resection. When resection of the maxilla is performed, it becomes an easy matter to isolate the tongue and diseased parts with hæmostatic forceps. If a little of the dorsal and lateral portions of the base of the tongue remain, these parts should be brought together, and the whole wound in the floor of the mouth sutured closely together with the

FIG. 2.—SUTURE OF THE STUMP AND REMAINING PARTS AND PERIOSTEUM IN COMPLICATED
EXTIRPATION OF EXTENSIVE DISEASE OF TONGUE.
(*Gazette des Hôpitaux.*)

stump to secure primary union and prevent septic infection of the sublingual tissues, the plan shown in Fig. 3 being followed.

The author claims that, by this method, which he²⁰⁸³ originally described seventeen years ago, the following results may be obtained:—

1. The total or partial extirpation of the tongue can be practiced without loss of blood.
2. That the method is applicable when the disease is propagated to the floor of the mouth, the pillars of the fauces, or to the lower jaw.
3. That it renders

unnecessary the preliminary ligature of the lingual arteries. 4. That the closure of the wound may be obtained not only after the extirpation of tumors limited to the tongue, but also in those which involve the floor of the mouth and a part of the lower jaw. 5. In order to facilitate the closure of the wound, the parts must be excised in a manner most favorable to the approximation of the remaining mucous portion. 6. The sutures are interrupted, but placed closely together, horsehair or silk being preferred. They should remain three or four days. This suturing of the intra-buccal incision is most essential as a preventive of infection and as a final hæmostatic. 7. The dangers of asphyxia (which is frequently threatened during the course of the operation) is obviated by keeping the patient's head inclined to one side, by placing sponges in the vestibule of the mouth, and by passing a thread through the epiglottis or holding it up with the aid of an appropriate pressure-forceps. (See Fig. 2.) 8. Whenever it is possible to preserve a part of the base, the shape of the tongue should be given to it. (See Fig. 3.)

At the London Medical Society^{Nov. 29, '90} Marmaduke Shield showed a case of leukoplakia linguæ, two years after half the tongue had been removed for undoubted epithelioma. The patient was a man, aged 73, who came under treatment in 1888. He had suffered from "bad tongue" for upward of twenty years, being an inveterate smoker. Removal of the whole organ was advised; but this was declined. The case was shown to demonstrate the local origin of these varieties of epithelioma. Shield raised the question as to the diagnostic value of "nests" in such tumors, especially in reference to a decision as to operation. The president said this important question involved another hardly less so, namely, as to how far surgeons were justified in removing portions of a growth for microscopical examination at the risk of general infection. Owen mentioned a case in which the lingual tumor turned out to be a gumma. Stephen Paget and Ballance confirmed the idea that the "nests" were sometimes met with in non-cancerous growths.

Cancer of the Tongue.—Wm. Alexander, of Liverpool,¹⁸⁷ has had considerable experience in the surgical treatment of this disease, and has tried almost all the methods of operating. He reports 19 cases, and concludes as follows: "If a patient consulted me

now with cancer of the tongue in the early stage, without infiltration of the floor of the mouth or glands, I would remove the affected half of the tongue with scissors, well free of the diseased nodule. This leaves the patient with all his faculties for a time. When recurrence has taken place, or in a fresh case where the floor of the mouth and the glands at the angle of the jaw are affected, but the diseased tissue non-adherent to the jaw, I would remove the whole of the tongue and floor of the mouth, leaving the jaw and skin. This is best done from the affected side, the preliminary incision extending from beyond the symphysis to the middle of the ascending ramus. When adhesions to the lower jaw have taken place, and its periosteum, the tonsils, or soft palate are involved, then I would remove all these parts right down to the hyoid bone, sacrificing any skin at all suspected of disease. All tissues in the neck can be sacrificed except the vagus nerve and the common carotid artery, the ligature of which is, at the cancer age, a fertile source of danger from coma and hemiplegia. In young people the common carotid can be ligatured with comparative impunity, but not at this time of life, as I know to my sorrow in one or two instances. A preliminary tracheotomy is absolutely necessary, and the larynx must be well plugged to prevent blood entering the lungs. The mouth I generally fill with absorbent boracic lint, and constant attention to cleanliness on the part of the nurse and care in feeding the patient are absolute necessities."

PALATE.

Cleft Palate.—Denuce, of Bordeaux, ¹⁸⁸_{Apr. 26} reports a case of cleft palate which he corrected by staphylorrhaphy. The paper is mainly interesting for the clear presentation of Albrecht's theory of harelip and cleft palate, which the author advocates.

At a meeting of the Académie des Sciences of Paris, Po-laillon ¹⁰_{Sept. 1}, ⁶⁷³_{Oct.} described his operation of staphylorrhaphy in two sittings. He allows an interval of twenty-four or forty-eight hours between the two stages of the operation. At the first sitting he makes the usual lateral incisions on both sides, dissecting off the mucous membrane from each side and loosening it from the palatal bones; then he arrests the hæmorrhage by compression or hæmostatic forceps. At the second sitting, he vivifies the edge of the tissues and introduces very fine sutures. This operation

may be done under cocaine anæsthesia. In 5 cases operated upon in this manner during the past year, the author has had perfect results. Two cases were from syphilitic perforation and the other 3 were congenital.

A set of elevators and long needles especially designed for operative treatment of cleft palate are described by Le Dentu.¹⁰_{Mar. 31} Probably the strongest paper yet presented by the prothetic side in the important question of "*Mechanism versus* Surgery in the treatment of congenital cleft palate," was submitted to the King's County Medical Society by Rodrigues Ottolengui,¹⁵⁷_{Aug.} of New York. The author takes a very pessimistic view of the surgical treatment of cleft palate, and paints a very rosy picture of its prothetic treatment.

The burden of his argument is that the correction of speech is the essential object to be sought for in our efforts at treatment, and that, therefore, "the most beautiful closure of a fissure without corresponding improvement in speech must be counted a failure." He says: "What is essential in every case in order to restore the function of normal speech? The answer is very simple, though its attainment is most difficult. It must be possible to completely shut off the cavity of the nares. This is normally accomplished by the coincidental approach of the soft palate and the posterior wall of the pharynx, which latter, rising, forms a well-marked ridge, against which the soft palate presses by elevation. It follows, therefore, that though the edges of the cleft may be brought together and union effected, unless the soft palate is long enough to meet the wall of the pharynx under the action of the muscles, the nares will not be cut off, and, practically, nothing will have been accomplished. Thus, a beautifully æsthetic result might be attained by operation which, nevertheless, would be of no benefit whatever in correcting abnormalities of speech."

According to the author, the conditions favorable to operation are very rare, and the best results are to be obtained by mechanical treatment. The devices—obturators, vela, etc.—invented by Kingsley are preferred and carefully described. In his analysis of 30 cases treated by Kingsley, the author concludes "that an average of sixteen months is the time during which a rubber velum will retain its usefulness. From an examination of the table we discover that the worst record is four vela in two years,—an average

of only six months; while the best is three in fifteen years,—an average of five years. We also observe that the majority use about one velum per year. The first cost of furnishing an instrument is necessarily high, because of the amount of labor and skill involved. To furnish duplicates of the vela, however, is simple, and the fee for the same but \$5.00.” While the author has carefully presented his side of the case, it is evident that he has entirely underestimated the achievements of modern palatine surgery, especially in the hands of such operators as Wolff, Ehrmann, Trélat, Billroth, and others, who have not only obtained ideal æsthetic results, but functional successes as well.

Another advocate of prothesis in the treatment of *palatum fissum* is Engelsen,³⁷³ who devotes much attention to the study of the relative merits of the Kingsley and Svensen mechanical appliances, and finally concludes in favor of the latter. A clinical lecture on cleft palate and its operative treatment is contributed by J. H. Morgan, of London.⁶

An aneurismal tumor of the right alveolar process and vault of the mouth, successfully treated by injections of a solution of the perchloride of iron in water, 1 to 4 (5 minims—0.32 gramme—at a time), is reported by Marshall, of Chicago.⁶¹ Owing to the sloughing which took place after these injections, the author recommends that a weaker solution, 1 to 6 or 1 to 8 of water, be preferred.

An adenoma (benign, encapsulated tumor) of palate successfully treated by enucleation is reported by Page.⁶ The patient, a man aged 40 years, was first subjected to a preventive laryngotomy, as preliminary to operation. The growth was as large as a hen's egg and projected into the fauces.

THE TRIGEMINUS.

Operative Treatment.—A partial extirpation of the ganglion of Gasser was successfully attempted by Novaro, of Bologna.²⁷⁶ The patient—male, 68 years—had been afflicted with a most rebellious neuralgia of the second and third divisions of the fifth pair during the eight years preceding the operation. Resection and stretching of the peripheral branches had been practiced, but had only temporarily relieved the patient. The removal of the Gasserian ganglion was undertaken by Novaro, who decided beforehand that only a partial operation would be performed,—only the

anterior portion of the ganglion (connected with the ophthalmic division), which contains the trophic centres of the eye, being respected. The following method was adopted: A cutaneous incision—V-shaped—was cut in the masseteric region, one branch of the V terminating opposite the tragus, on the root of the zygoma. The other (anterior branch) terminated on the malar bone, on a level with a line drawn downward from the external angular process of the frontal. The loop of the V rested about midway of the masseter muscle. The flap of skin thus circumscribed was lifted up; the temporal aponeurosis exposed on the zygoma was divided parallel with this arch; the masseter was lifted away from its attachment to the jaw and zygoma, and with the help of a second cutaneous incision, which circumscribed the angle of the maxilla, the external surface of this bone was sufficiently denuded of its overlying parts to allow it to be sawn through in a vertical direction behind the third molar. The ascending ramus of the maxillary, which was thus mobilized, was bodily elevated, disarticulated, and removed, after section of the temporalis tendon, pterygoids, and articular ligaments. The inferior dental and artery had to be divided. After the extirpation of the bone, an assistant retracted the temporalis muscle upward, and the operator was thus allowed to denude the inferior surface of the great wing of the sphenoid and zygomatic fossa. With the help of a narrow chisel, the base of the pterygoid process and the great wing of the sphenoid was attacked in the space which lies between the round and oval foramina, great care being taken not to open the cavernous sinus.

After removing enough bone, Novaro gently detached the dura mater, and, having exposed the second and third branches of the fifth, they were seized with forceps and entrusted to an assistant, who, by making traction upon them, helped the operator in the work of completing the dissection of the ganglion, which was removed piecemeal with the aid of a fine rat-tooth forceps and sharp curette. The chief aim of the operator throughout was to avoid injuring the antero-internal portion of the ganglion, which contains the trophic centres of the eye and is attached to the walls of the cavernous sinus. The operator succeeded completely, and the whole of the condemned part of the ganglion was removed with the two inferior divisions up to their foramina of exit. The wound was then carefully packed with an iodoform-gauze tampon.

The operation consumed one and a half hours. Forty-five days after, the patient was in excellent condition; the eye remained sound and he was totally free from pain. Notwithstanding the complete extirpation of the second and third divisions of the fifth, the territory supplied by these nerves remained normally sensitive.

This attempt at the removal of the ganglion of Gasser is the fourth on record. Rose, of London, first performed the operation, and did it twice, successfully, but by different methods each time. In his first operation (*vide* ANNUAL for 1891, this section) he opened a large route to the base of the skull by resecting the upper jaw; in the second case he followed the method recommended by Krönlein. He really adopted the Pancoast-Salzer method for the resection of the second and third divisions as these emerge from their respective foramina. In both operations he applied a trephine to the foramen ovale. The third operation was performed in Italy by Caponello, who also followed Krönlein's method; his patient died on the third day, from meningitis (a partial excision). In Novaro's case, the loss of the corresponding eye from ophthalmitis, which unfortunately took place in Rose's first case, appears to have been happily obviated by his procedure.

A most important contribution on the various surgical procedures devised for the relief or cure of trigeminal neuralgia (tic douloureux) is made by Victor Horsley, assisted by James Taylor and Walter S. Coleman.² Nov. 14, Dec. 5, 12 Among other papers of value, we would especially mention the critical thesis of Louis Raulin, Bordeaux,²⁰⁹⁶ and an excellent paper on "Resection of the Second and Third Divisions of the Fifth Nerve at the Foramina Rotundum and Ovale," by S. J. Mixter, of Boston,⁹⁹ Aug. 13 who calls attention to the case with which both these nerves may be reached through a single vertical external incision, and also speaks of certain variations in the anatomy of the bony structures met with during the operation. The method described by Salzer,⁸⁴ p. 461, 77 is the one referred to by the author. Two cases of neurectomy for severe neuralgia are reported by T. T. Paul.¹⁸⁷ July Redier,²²⁰ July 17 reports a partial excision of the inferior dental for a neuralgia of thirty-five years' duration. Velpeau's operation by trephining the maxilla was adopted. The case was reported fifteen days after the operation, and up to that time the neuralgia appeared to have been kept in abeyance.

SURGICAL MYCOSES AND TUMORS.

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TUBERCULOUS GLANDS.

IN an essay on the value of polyadenitis, in the diagnosis of tuberculosis in children, Marinescu¹¹⁸ refers to the fact that positive signs of tuberculosis in young infants and children are lacking, and that we are frequently obliged to make only a diagnosis of probability when the disease is already far advanced. Some years ago, Hutinel observed that the majority of children presenting symptoms of tuberculosis also had general adenitis. The swollen glands are to be felt everywhere, forming a general adenitis, and are found in regions where there is no other trace of tubercular involvement; they never change in size or consistence. Suddenly a bronchitis develops, followed by broncho-pneumonia, from which the child dies. Microscopical examination reveals caseous spots and the presence of tubercle bacilli throughout the affected glands. The name of generalized peripheral adenitis has been applied to this condition by Grancher.¹⁷ A case of adenoma of the sweat-glands is reported by Perry.²⁸ The patient was a woman, aged 31, who had been affected with the disease since her tenth year. Of late the affection had become greatly aggravated, both in the number and size of the individual tumors. Microscopical examination proved that the ramifications of the sweat-glands were greatly enlarged, and there was a thinning of the superficial epidermis. A great deal of pigment was observed in many of the gland-cells, which microscopical examination showed to consist of black points. There were no inflammatory appearances. The swellings, after having been pricked with a needle, were removed by the scissors or scalpel, a perfect cure following.

Treatment.—Schwartz³⁵ gives details of a case in which injections of carbolic acid destroyed the tendency of the glands to develop. Reboul,⁴⁶ Courtin,¹⁸⁸ and Nélaton³ vaunt the use of

(L-1)

camphorated naphthol in tuberculous adenitis. Reboul's communications are based on 47 cases. In 43 of these the cervical, in 1 the axillary, and in 3 the inguinal glands were affected. In 18 cases the glands were hard, in 24 softened, and in 5 ulcerated. Of the 47 cases, 28 were cured and 19 improved. The cure, however, was not complete, but the improvement was remarkable. The treatment is absolutely harmless, and seems to act beneficially both on the local and on the general condition. The mixture consists of:—

℞ Naphthol-β,
Camphor, 10 grammes (2½ drachms).
Alcohol (60 per cent.), 40 grammes (1½ ounces).

This is to be used, with aseptic precautions, by means of a Pravaz syringe, a few drops being injected here and there throughout the mass of enlarged glands. Haye⁸¹ uses tincture of iodine in combination with electricity. The negative pole of an ordinary galvanic battery is covered with chamois-skin, over which is fitted an ordinary hard-rubber cup, to prevent evaporation. Ten drops of tincture of iodine are poured on the chamois-skin. This pole is applied directly to the tumor, and the positive pole at some indifferent point. Six cells are switched in use for eight minutes. After two minutes, a distinctly metallic taste can be perceived in the mouth, due to the presence of iodine, and showing that the medicine has permeated the system. Much improvement has followed this mode of treatment.

Solutions of iodoform and ether, after the method of Verneuil, continue to afford the best results, as reported by De Pezzer.¹⁷ He concludes that this treatment, in cases where operative procedures were indicated, has brought a lasting cure, without a cicatrix; and that these injections seem to exert a beneficial action not only on the tuberculous glands treated, but also on those at a distance from the seat of the injection. Watson Cheyne⁶ gives full details of his experience in the use of Koch's tuberculin in the treatment of surgical cases. At the time of his writing, he stated that its exact place in surgery would depend upon whether the early improvement turns out to be more or less permanent, and whether it is obtained rapidly, in comparison with the results obtained by operative measures. Lannelongue¹⁴ communicated to the Académie de Médecine his theory of the necessary

transformation of the tuberculous tissues into a sclerotic mass in order to obtain a cure. To this end, he injects a solution of chloride of zinc about tuberculous foci, whereby new fibrous tissue is generated, which encapsulates the diseased portion. Twenty-three patients suffering with joint and gland tuberculosis had been thus treated; a formation of fibrous tissue occurred in every case, with remarkable improvement in the general condition. The injections were often repeated, and consisted of 2 to 5 drops of a 10-per-cent. solution of the zinc chloride.

Creasoted oil has been employed by Burlureaux,³_{Apr. 4} who has given a patient, during six months' treatment, 4 kilogrammes (10 pints) of creasoted oil (1 to 15), without any harm. He reports 2 other cases in which, in about three weeks, the tuberculous glands of the neck disappeared. In a paper read before the German Surgical Congress, Senger⁶⁰_{No. 17} stated that, in the treatment of tuberculosis by the iodoform-glycerin injections, the effects differed greatly according to the quality of glycerin employed. It was found that impure glycerin contained always a certain amount of formic acid, the proportion varying according to its degree of impurity. This led him to infer that the marked irritating properties of the formic acid might have some share in the curative effects of iodoform emulsions. The fact that iodoform, when introduced into the body, is converted by the process of oxidation into formic acid and hydriodic acid, explains its varying effects in different cases. When oxidation is sufficiently active to decompose it, iodoform exerts a curative action which is not manifested when the process of oxidation is feeble. For these reasons the author added formic acid to iodoform emulsions, and obtained favorable results where the latter had proved ineffective. In cases of tuberculous affections of the glands and in a case of tuberculous arthritis of the ankle-joint formic acid was used alone, the formate of soda in solution being injected. The results were excellent. François Hue²⁰³_{Apr. 16} describes the treatment of local tuberculosis, and says that in the Hospital of Pen Bron the principal treatment consists in aërotherapy and salt-water baths. The children are in the open air all day, playing on the beach. The advantage of the climate is its mild temperature, allowing patients to partake of the baths the year round, surcharged with chloride of sodium. Of 8 patients suffering with Pott's disease, coxalgia, and scrofulous

glands, 6 were cured, and the others improved in the course of a few months. Poisson¹²⁷ gives an excellent account of the treatment of tuberculous synovitis of tendons. He distinguishes two distinct forms: (1) synovitis with riziform grains; (2) synovitis with fungosities. After reviewing the various modes of treatment, such as immobility, injections of ether and iodoform, Fowler's solution, and ignipuncture, he comes to the conclusion that the best plan is free incision of the tumor with thorough curetting by means of the sharp spoon. When, however, the tumor is limited and encapsulated, a still better practice is to dissect out the growth methodically, thus effecting a more brilliant and complete cure.

ABSCESS.

Marcus⁵⁸ reports the case of an abscess in the breast of a virgin, the patient being a girl, aged 17, usually in the enjoyment of excellent health. There was no history of injury or menstrual irregularity. Pain, of a lancinating character, was for some time the only symptom, and, finally, deep-seated suppuration became evident. Incision evacuated 2 teacupfuls of pus. The tissue was thoroughly scraped; there appeared honey-combed abscesses, deep sacs existing over the pectoralis major. The case ultimately did well. J. P. Connelly⁹⁹ presented to the American Medical Association a case of fatty urine, accompanying an abscess in the right iliac fossa, in a colored woman, who, after childbirth, had chills at regular intervals, with pain, and a deep-seated tumor in the right iliac fossa. The urine was covered with an oily substance like olive-oil, but which became of a tallowy consistency on cooling. Three and a half ounces (92 grammes) were passed daily for some days, when there was a sudden discharge of pus with the urine, and the fat immediately and permanently disappeared. Happel⁶¹, Laplace¹⁹, and Packard¹⁹ report psoas abscesses, where a free incision afforded relief and cure. Glandular abscesses in children have been studied by Hofmeier¹, who concludes that they are caused by no special diathesis, but by various forms of infection. Hence, reliance is placed upon the local antiseptic treatment and tonics. Lemièr²²⁰ tells of 5 cases in which he produced aseptic suppurations as a result of the injection of drugs. In 1 case sulphuric ether, 1 cubic centimetre (14 grains); in the other cases a 30-per-cent. nitrate of silver, 0.20 gramme (3 $\frac{1}{10}$

grains). Microscopically, and from cultures, the resulting abscesses were found to be free from micro-organisms. Verneuil and Beretta³_{Aug. 1} speak of the transformation of a cold abscess into an acute form, attributing it to a secondary infection by the streptococci of suppuration, and considering it as a favorable turn in the progress of the case, inasmuch as such abscesses heal more readily and permanently than those which have not thus been infected. They reason that, perhaps, a direct antagonism might exist between the tubercle bacilli and the micro-organisms of suppuration.

Treatment.—At the Congress of French Surgeons, Piéchaud, of Bordeaux,¹⁴_{Apr. 8} detailed a new treatment of cold abscesses without incision. Antiseptic puncture, followed by antiseptic lavage of the abscess-cavity, results in recovery, without complications. In 2 cases the pus was contained in large pockets, on the thigh and buttocks. Bacteriological examination of the pus revealed the presence of streptococci and staphylococci. He has had 20 successful cases, which were treated as follows: After making the puncture, the cavity was washed out with a solution of boric acid, then with a sublimate solution ($\frac{1}{1000}$). Cure rapidly follows this treatment, even in cases where the skin is beginning to slough, as was noticed several times. Sublimate poisoning was never observed. Barker²_{Feb. 7} recommends the treatment of tubercular and other abscesses by hot-water flushing without drainage. The lining membrane of the abscess is removed; in fact, in all abscesses—acute or chronic—it is his practice to remove sloughing cellular tissue and lining membrane by copious washing and the free use of gauze attached to forceps and rubbed over and into every part of the abscess-cavity. This treatment does away with the drainage-tube and eliminates the continued irritation often produced by it. Mayo Robson,²_{Apr. 25} Para,¹¹⁸_{May} and Mercier¹²²_{Apr.} report excellent results from the simple injection of iodoform and ether, after evacuating the cold abscess by puncture.

FURUNCULOSIS.

According to Veiel,⁸⁰_{Mar.} the treatment of this affection presents the four following indications: 1. The pus-forming micrococci, which have penetrated into the skin, must be destroyed by anti-parasitical measures before they have produced tissue changes. 2. When tissue necrosis has occurred, the indication is to accelerate

the exfoliation of dead tissues, so as to remove the micrococci as rapidly as possible. 3. To prevent new formation of furuncles. 4. To place the system in such a condition that it may be most capable of resisting the infection of the pus-forming micro-organisms. To fulfill the second condition, the author decidedly favors the use of hot poultices. Vogt⁷³_{Dec. 12, '70} believes in the infectiousness of furunculosis, the micro-organism being retained by clothing, and resisting the ordinary laundry processes. Drury,⁵³_{Dec. 12, '70} Tapper,⁸²_{Feb. 7} and all others agree that antiseptic lotions and injections present the most efficient means of abortive treatment.

CARBUNCLE.

Evan Powell²_{Dec. 1, '70} describes the occurrence of an epidemic of boils and carbuncles. A patient was admitted to the hospital ward with two boils. Before these two boils were healed the man had a carbuncle on his back, and, whilst this was being treated, the disease spread to two other wards, there being in all 32 cases, principally among debilitated patients.

Treatment.—Spohn¹⁹_{Feb. 7} recommends the use of a 10-per-cent. lotion of chloral hydrate in glycerin and water, applied constantly, by means of absorbent cotton-wool, combined with the internal administration of calcium sulphide. Riedel,⁶⁹_{July 1} advocates total extirpation of the carbuncle. The patient being anæsthetized, a crucial incision is made and the four segments removed. The wound is packed with iodoform-gauze and treated on general antiseptic principles. The advantage of this treatment he claims to be the removal of the disease *in toto*, thus avoiding local or general infection. It brings about a cure in a shorter time, and with less disfigurement than the old method.

ANTHRAX.

Goldschmidt¹¹²_{May} reports a case of anthrax in a brush-maker, where infection took place from the bristles used by the patient in his work. The disease began with sudden swelling of the submental region, accompanied with fever, chill, headache, and wild delirium, followed by hæmatemesis, bloody stools, and dyspnœa. Death occurred on the fourth day. The section revealed the serous cavities filled with serum, the glands of the neck swollen, with hæmorrhagic infiltration; ecchymosis on the pleura of both lungs,

the peritoneum, and the mucous membrane of the stomach and small intestine. The spleen was large and soft, and there was enormous swelling of the mesenteric glands. Microscopic examination of the tissues and fluids showed myriads of anthrax bacilli.

The case of an infant, 5 months old, has been described by Ollivier.²_{Sup., May 9} The child was suffering from a disorder diagnosed as general bronchitis, with some patches of broncho-pneumonia. Attention was drawn to two unusual symptoms: slight but general œdema, and an erysipelatous patch on the front of the chest on the right side. The child died after an illness of nine days. The necropsy revealed the typical lesions of anthrax. There was no evidence as to the mode of infection.

Immunity.—Mme. O. Metchnikoff,²⁶²_{Mar.} having made experiments regarding the fate of bacilli contained in the vaccine used to confer protection against anthrax, draws the following conclusions: 1. The bacilli contained in the anthrax vaccine produce their effect by growing at the point of inoculation, without necessarily being propagated throughout the economy; save exceptionally, and to a feeble degree, they do not penetrate into the organs. Vaccination is thus due to the products of the bacilli, which diffuse into the organism from the point of inoculation. 2. The destruction of the bacilli takes place at the point of inoculation, and is effected by the phagocytic activity of micro- and macro-phagi. 3. Vaccination depends upon accustoming cellular elements to the toxic products of the bacilli. This last conclusion is supported by the fact that in the vaccinated animal the vaccine and the virus develop normally in the aqueous humor devoid of cells, while they are destroyed in the organism where they are accessible to the influence of the cells. Rondenko, of Moscow,²⁶²_{Aug.} reports the results of some experiments, with the object of disproving a frequently-quoted statement of Ogata and Jasuhara,⁵⁰_{p. 25} that the blood of animals naturally immune against anthrax, such as the frog, rat, or dog, produces attenuation of the bacillus which develops in it. These authors had reported that a single drop of frog's serum or half a drop of dog's serum produces attenuation of the bacillus which develops in it; also, that a single drop of frog's serum or half a drop of dog's serum, if injected into mice, is sufficient to protect them against anthrax. Rodenko proves, from a series of 22 inoculations in mice, that ordinarily the blood or serum of

frogs has no power of protecting mice against even very weak anthrax.

Treatment.—The treatment of malignant anthrax by means of the toxines of putrefying fluids has been studied by Kosturin and Krainski,⁶ with the result that the development of anthrax was only slightly retarded in the animals thus treated. Tissue-fibrinogen solution which has been sterilized by boiling has been found by Wooldridge,² when injected into rabbits, to render them immune against anthrax. In an exhaustive article, Wright² defines tissue-fibrinogen from a chemical stand-point, and reports experiments upon the immunity-conferring power of a solution of tissue-fibrinogen, sterilized by being passed through a Chamberland filter.

E. H. Hankin⁵⁰ has succeeded in isolating from the spleen and blood-serum of the rat an albuminoid substance which destroys bacterial life. It is a basic body, differing from bases already known in being insoluble in alcohol and in water, and in not dialyzing. It is a globulin; and to its presence is ascribed the power possessed by the blood-serum of the rat for killing anthrax bacilli. Fazio finds that when the anthrax bacillus is imbedded in the soil five or six months it loses its virulence, though it retains its original type as to form. Arnoldow¹⁷ recommends the following injection in cases of anthrax:—

R. Hydrarg. corros. chlor., 1 part.
Sol. acidi carbolici (5 per cent.), 250 parts.

M. Ft. sol. et sig: Inject, once or twice daily, into the substance of the anthrax, two Pravaz syringefuls of the above solution. Wash the tumor thoroughly with a 1- or 2-per-cent. sublimate solution, and apply sublimate gauze and carbolated compresses.

Grabowski²⁶ reports the successful treatment of 10 cases of malignant pustule by deep injections of carbolic-acid solutions (5 per cent.) into the periphery of the pustule. He injects one-half of a Pravaz syringeful, making around each pustule two to six punctures. The pustule itself is brushed with pure carbolic acid and dressed with hot compresses; wine is given internally in small doses. In 99 cases of malignant pustule treated with carbolic acid, as reported by different authors, there has not been a single fatal termination. The use of ipecacuanha locally, in form of powder, and internally, also administered as a powder, in doses of 5 grains (0.32 gramme) every four hours, is reported as highly successful

by Davies-Colley,⁸⁰_{Aug.} who was much struck by the success following the use of ipecacuanha by Muskett, who, in South Africa, treated 50 cases without a single death. Evans, from a series of experiments on pure cultivations of the bacillus anthracis, finds that ipecacuanha, in quantities of 5, 4, 3, and 2 grains (0.32, 0.26, 0.19, and 0.13 gramme), added to tubes containing 5 cubic centimetres (1½ drachms) of broth, invariably destroyed the vitality of all the anthrax bacilli present, and no growth occurred in the tubes inoculated; provided, always, that the bacilli contained no spores.

ACTINOMYCOSIS.

Etiology.—In an exhaustive review of this subject, Vander Straeten⁵²_{Sept.} concludes that *cereals* must be the principal source of infection from actinomycosis, inasmuch as attempts to communicate the disease from animal to animal has failed. Furthermore, the disease, existing mostly about the jaws of herbivorous animals, would point to infection from the vegetable kingdom. Bostroem⁷⁶⁸_{R. & H. 1, '90} likewise concludes that this parasite belongs to the pleomorphic variety; that it seldom produces metastasis, and is only secondarily attended by suppuration,—that is, after infection by the streptococcus pyogenes aureus. From the observation of 32 cases, he thinks that the poison enters the economy by means of the infected grain of some cereal, which can always be found imbedded in the focus of development of the disease. Max Wolff³³⁶_{No. 26} has succeeded in cultivating the germ, both under aërobic and anaërobic conditions, and also assures us of his having succeeded in conveying the disease to animals from fresh, pure cultures. Kern²¹⁴_{Sept. 15} reports a case of actinomycosis of the ileo-cæcal region, with cure by surgical treatment. A case of actinomycosis and tuberculosis combined is reported by Herbert Snow,²_{July 18} showing the existence of miliary tubercles in the lungs and a genuine actinomycosis of the breast. “On microscopic examination, in addition to abundant tubercle, the characteristic rays of actinomyces were found in the lung.” Perroncito, Crookshank, Nocard, and Salmon,²²_{Aug. 26} at the International Hygienic Congress, decided on the absolute necessity of laws being passed protecting the people against meat tainted with this infection.

Treatment.—Darier and Gautier¹_{Aug. 8} report a case of actinomycosis of the face, involving the whole right side, which, after all

other treatment, was submitted to the electro-chemical treatment of Gautier; that is, the hypodermatic injection of a 10-per-cent. solution of iodide of potassium in the dead tissue, followed by the insertion of needle-electrodes, through which was passed a current of 50 milliamperes for twenty minutes. Three *séances* at intervals of eight days and one sixty days later accomplished a perfect cure. Köttwitz⁶⁰ records the marked success which followed cauterization with solid nitrate of silver. One case had been chronic, numerous recurrent deposits taking place, which required incision and formed chronic fistulæ. Three other cases were also cauterized, in similar fashion, after opening of the abscesses, a speedy cure having been obtained in each instance. According to Thiriar,¹⁷ the treatment should be purely surgical. The tumor should be removed, the parts scraped, and the parasite destroyed by every possible means. He removes the parts plentifully, and disinfects with a 1-to-1000 sublimate solution. Billroth⁸⁴ showed the case of a builder, who had actinomycosis of the lower portion of the abdomen, communicating with the bladder, in which, when all else had failed, a cure was effected after the use of 15 tuberculin injections, commencing with 0.01 gramme ($\frac{2}{13}$ grain) and ending with 0.25 gramme ($3\frac{1}{2}$ grains). After the usual disturbance, local and general, the growth disappeared entirely. He thinks this a better result than in any known case of lupus. Carl Koch³⁴ reports 3 grave cases of actinomycosis treated by operative measures, 2 of which recovered; and Doyen⁸ describes 2 cases, both of which recovered after operation.

CYSTS.

Voituriez²²⁰ describes the disease of Reclus—cystic disease of the breast; this condition is said by Pilliet,⁷ to be the same as cystic epithelioma. Poirier⁶ has studied 500 knee-joints, of which 200 were injected, and has found, contrary to the text-book teaching, that popliteal cysts are, for the most part, in communication with the joint, and are of joint origin. His conclusions are that (1) the cyst between the inner gastrocnemius and the semimembranosus is extended and rendered larger in extending the joint and diminished in flexing it; (2) the cyst of the bursa of the popliteus muscle appears, as a rule, like a tumor in the deeper part of the calf; (3) cysts in the neighborhood of the condyles, on a level with the insertion of the gastrocnemii, are in communication with the joint.

A large congenital cyst of the neck was removed by Walter⁷_{Oct. 21, '90} from a child 6 months old. It was found to be an angioma, in which the endothelium of all the blood-vessels was undergoing rapid proliferation. A dermoid cyst "about the size of a man's fist" was presented by Herrmann²_{Sup. May 2} to the Prague Medical Society. It was situated in the right breast, and Herrmann believed that it arose not from the mammary gland, but from the subcutaneous connective tissue and invaded the glandular tissue. A dermoid cyst was found in the coccygeal region of a woman by Pousson.¹⁸⁸_{Feb. 1}

Barrie reports a hydatid cyst of the lumbar region, developing from the prevertebral cellular tissue; and Scheboldajen⁸⁴⁴_{Aug. 3} 2 cases where hydatid cysts were found in the abdominal walls, thigh, pleura, lung, and diaphragm. Both succumbed after operation.

TUMORS.

CANCER.

Pathology.—William Russell²_{Dec. 13, '90} describes certain bodies which he calls fuchsin bodies, and to which he attributes the causation of cancer. This is the result of a process of double staining of the sections, first by fuchsin and then by iodine green, without passing the sections through any special decolorizing agent; the iodine green replaced the fuchsin in everything except these bodies. The directions for staining are as follow: (1) saturated solution of fuchsin in 2 per cent. carbolic acid in water; (2) 1-per-cent. solution of iodine green (Grüber's) in 2 per cent. carbolic acid in water. Place section in water; then stain in fuchsin ten minutes or longer; wash for a few minutes in water; then wash for half a minute in absolute alcohol. From this put the section into a solution of iodine green, and allow it to remain well spread out for five minutes. From this rapidly dehydrate in absolute alcohol, pass through oil of cloves, and mount in balsam. The rounded bodies are found mostly about the fibrous tissue and lymph-spaces of the various growths. Russell thinks there is no doubt that this organism is a fungus belonging to the sprouting fungi (sprosspilze of Nägeli). Dean,⁶_{Apr. 3} on the other hand, finds them to be hyaline bodies due to a degeneration. The term hyaline is used in its widest sense, and may originate from a number

of different sources, *e.g.*, from blood-plasma, blood-plates, blood-corpuscles, epithelium. These fuchsin bodies were also found in other than cancerous structures. Two were typical cases of uterine myoma without a suspicion of cancer of the lungs. They were found in the connective tissue around the bronchial glands in a case of syphilis; also in a case of phthisis, in 2 cases of normal tissues, etc. The conclusions reached by Dean, therefore, are: (1) that the bodies are not to be regarded as micro-organisms; (2) even admitting that they are of vegetable origin, they cannot be regarded as pathogenic, *i.e.*, they cannot be regarded as the "characteristic micro-organism of cancer."

Contagiousness.—Sorel,²⁰⁸_{Dec., '90} in an elaborate article, concludes that (1) cancer is of the most frequent occurrence in the country, and must, therefore, be due to a cause outside of the organism; (2) *water* is the habitual cause of contagion, as is demonstrated by various cases cited; (3) the contagion may spread from one to the other in the same household. Arnaudet¹⁷_{Oct.,} quotes, likewise, quite a number of cases in which he traces the contagious nature of cancer to drinking-water. Shattock and Ballance²²_{Sept.,} and Roger Williams⁶_{Sept. 13} also view with favor the infectiousness of carcinoma; but the most important communication in this direction was made by Cornil,³_{June 24} who reported 2 cases of cancer, transplanted from one part of the body to another, on the same patient, as related to him by a surgeon, whose name is not made public. The first case was that of a woman having a large tumor of the breast. Having removed the tumor, the operator implanted a small portion of it in the healthy breast, under the most careful antiseptic precautions. At first, nothing was observed; but soon an indurated nodule was observed, which grew rapidly, reaching, in two months, the size of an almond. This patient died, a short time afterward, of an intercurrent disease, but at the autopsy no trace was found anywhere of cancerous metastasis. The same result was obtained in another case of cancer of the breast, but the patient was unwilling to submit to an operation for the removal of the grafted tumor. These 2 cases demonstrate, beyond a doubt, the communicability of cancer. Eiselsberg⁸_{Nov. 27, '90} reports the successful transplantation of a fibrosarcoma from the back of one rat to the peritoneal cavity of another rat, where it grew rapidly, and presented the original character of the plantar tumor.

Schleich⁶⁹_{No. 16} considers tumors to be of too highly organized formation to be caused by a special virus or by a bacterium, but to be due to a sort of endogenous infection. According to his theory, the formation of new tissue in a tumor is analogous to the growth of a fecundated egg, and the tumors themselves are the products of pathological generation and fructification. The impregnating forms of the infectious cell and any tissue-cell may become such if, at a certain stage of its physiological development, it is exposed to irritation.

In an irreparable case of cancer of the breast, Hahn,²²_{Aug. 6} in order that the utter hopelessness of the case should not be discovered by the patient, transplanted small pieces of healthy skin into the carcinoma, a piece of skin bearing nodules being implanted where the healthy skin was taken away. The psychic effect was all that could be desired. The pain ceased, and the patient became much more comfortable. The grafts grew in all of the places, much to Hahn's surprise, and, when the patient died, two months afterward, from internal spread of the disease, the cancer-nodules had developed to the size of cherries. Among the general conditions specially liable to result in cancer, Herbert Snow⁶_{Dec. 27, '90} mentions mental distress as the most important. In malignant disease of the breast and uterus, it commonly appears as the sole immediate antecedent. In all varieties it seems to predispose, although, when other localities are attacked, a mechanical, exciting cause is, on careful inquiry, usually to be traced in addition.

Bayard Holmes⁷⁷⁹_{July} believes cancer to owe its origin to destructive parasites of man, and an occasional parasite of the domestic animals and other vertebrates, especially when kept in captivity. The reaction of the tissues to its irritation is at first slow. It reaches the reproductive stage inside the cell itself, and is then disseminated through the lymph-channels. The causes which determine the localization of carcinomatous infection are those acting from within the host and those acting from without. Among the former are *age*,—after 50; dyscrasia, syphilitic or tubercular; trophic neuroses, diseases of the central nervous system, and diseases of the circulatory system. Among the external causes are those which produce local irritation, and which may be classed as thermal, chemical, biological, and anatomical.

Treatment.—Perhaps the most important communication of the year upon the treatment of cancer is the series of papers by Adamkiewicz,⁵⁷ in which he explains the specific reaction upon cancerous tissues of a new substance,—“Cancroin.” This sets up an inflammation about the new growth, giving it a curative tendency. Metastatic accumulations pursue an equally favorable course under the treatment, becoming smaller and ultimately disappearing, while the cancer itself first appears to swell, later becomes red and necrosed, and is afterward thrown off. Many cases were treated, in all of which Adamkiewicz reports a cure. No particulars are given as to the composition of “Cancroin,” nor have the experiments been repeated by any one else. Mosetig-Moorhof¹⁰² reports a number of inoperable, entirely hopeless cases, that had been successfully treated by him with parenchymatous injections of blue pyoktanin (methyl-violet) during several weeks. Fifty injections of a 1-to-500 solution and a few 1-to-300 were used; in all about 120 grammes (4 ounces) of the solution were employed. Camillo Lodigiani⁵⁸⁹ reports several cases of apparent improvement; whereas Grün² reports a case of scirrhus of the breast, in which the result was purely negative. Dyer¹² has used fuchsin in 4 cases: 1 of cancerous ulceration of the groin, treated with a solution of fuchsin in alcohol, cured in five and one-half weeks; 1 of carcinoma of skin and chest, with ulceration extending up the axilla,—at the end of the fourth week it had diminished one-fourth, with no inclination to extend; epithelioma of the face,—in four weeks a remarkable improvement was observed; very extensive epithelioma of the face,—cured. The writer concludes that fuchsin acts as an antiseptic, stimulant, anæsthetic, deodorant, astringent, and antiphlogistic. J. Mortimer Granville⁶ has made a further communication regarding his treatment for cancer by means of thallin internally and papain externally. He says: “In the result of my experience to this date I am able to say (1) that none of the earlier cases have relapsed; (2) that scirrhus tumors, of large size and undoubted authenticity, have gradually disappeared without any operative interference; (3) that the health of patients has improved under treatment, and the cachexia vanished. The principal modifications I have made are the following: Instead of thallin I use a periodohydromethyloxychinolin, because it is better borne, and seems to be more effective than the tetrahydro-

paraquinanisol; and I inunct or inject the tumor with a papain, specially prepared, because I have reason to believe that it is not the proteid elements, but the organized ferment of the papaw-juice, that produces the effects observed."

Gourine²⁴_{Oct. 26} proposes to treat tumors and plastic exudates by artificially raising the local temperature above the temperature of the body, without causing a burn, but producing degeneration of the heated tissues. A cancer of the breast is said to have gradually shrunk under the continued application of a hot antiseptic poultice. The reduced tumor was finally excised. Marcus Fay⁷⁶⁰_{Sept. 26} cites the following cure for carcinoma: The patient, a woman 77 years old, came to him with an ulcerating cancer of the right mamma. Surgical interference being out of the question, Fay ordered the patient to paint the ulcerated surfaces frequently with tinctura creasoti cum opii, which relieved the pain and destroyed the fetid odor; he prescribed aniline internally. After three weeks the dropsy disappeared in the lower extremities, the adhesions began to shrink, as did also the enlargement of the axillary glands. Hilary Schramm⁵⁶⁹_{Nov. 40, '90} and Parsons²⁶_{Dec., '90} used electricity (voltaic current) to arrest the growth of cancer. Schramm concludes that no permanent benefit is to be obtained from the interrupted voltaic current. The battery required must have a high electro-motive force, and be capable of sending 500 milliamperes through a resistance of 800 ohms. It is very necessary to form a correct estimate of the extent of the growth and its ramifications, or portions of it will escape treatment.

It is quite conceivable that an application may just fall short of a total destruction of vitality in the cancer-cells. If a second application is then made, before the cells have had time to recover themselves, a satisfactory result follows. A weak current, repeated several times, has not the same effect as a more powerful one applied less frequently. It appears to be necessary to use 400 milliamperes to produce a permanent effect, although a current of half this strength, thoroughly applied, has a marked action on the growth, and seems to paralyze the cells for some time. For this reason, it is very easy to fall into error and to stop short of doing enough. There is no fear of shock after the application. In many instances the circulation is improved, and there is no loss of blood and no rise of temperature. Sixteen cases are cited, which,

the author says, demonstrate in a remarkable way the power of his system of applying electricity. The majority of the cases were brought to him when they were beyond every other means of treatment; yet in many the disease was stopped for some time, while the early cases gave promise of permanent results, the first having now been arrested for two years, without requiring any further application beyond what was done in the first three weeks. The advantages of this treatment are: (1) the absence of shock after the application; (2) the facility with which it can be repeated if recurrence takes place; (3) the fact that it can reach disease where the knife cannot; (4) the fact that it is easier to get at the whole of the disease in an early stage than by any other means.

Brodhurst,⁶ reports the disappearance of scirrhus glands under the action of injections of acetic acid. He has used them in several other cases with satisfactory results. Sir Hughes Bennett,⁷ claiming to have had remarkable results from the local application of ice, W. P. Sprague proposes "to thread metallic wires, from a central point of the cancerous mass, in various directions, in order to conduct cold more thoroughly into the remote portions of the diseased growth. These wires are properly united to a metallic plate, and, cold being applied to this, it will be conducted indefinitely to the growth.

Coley⁹⁶ has treated 3 cases of sarcoma by inoculation with erysipelas. He used 20 milligrammes of a beef-tea culture of erysipelas, and repeated three times. The reaction was marked each time, the temperature rising to 105° F. (40.6° C.), but was easily controlled. In all there was quite marked temporary improvement. In 1 case the growth had not returned three years subsequently.

With relation to operative measures, Heidenhain,⁹⁹ concludes that (1) the results to-day obtained by operation are superior to those obtained before the days of antisepsis; (2) the results are better the sooner the diagnosis is made and the sooner the operation is resorted to; (3) cancers and their recurrent growths should be removed as long as the operation is practicable in sound tissues. The operation should always be a radical one.

Terrillon⁹⁷ summarizes his results in 100 removals of the breast as follows: 1. The danger of the operation is about *nil*. 2. A return of the disease seems to be the rule when the axillary glands

have become implicated. 3. This relapse is most common during the first years after the operation, a period rarely exceeding six or seven years. 4. All malignant tumors and mixed tumors of the breast should be freely removed. The same is true of enlarged axillary glands. 5. A return of the disease may be operated upon one or several times, especially when it is possible to effect an immediate reunion of the skin. Successive operations seem to exert a happy influence on the progress of the malady.

Brinton⁹ thus states Chiene's method of testing a tumor of the breast for carcinoma: (1) excise the mamma; (2) wash thoroughly in water to remove blood; (3) place in a 5-per-cent. solution of nitric acid for five minutes; (4) wash in cold water for five minutes. The carcinomatous structure then appears of a dull, white color, like "the eye of a boiled fish" or egg-albumen, the healthy tissue remaining translucent and gelatinoid. In the case tested by Brinton the reaction was very striking.

Symptoms.—Snow⁶ described a painless and slowly progressive prominence of the sternum, between the second costo-sternal articulations, consecutive to carcinoma of the female breast. This is a common physical sign of latent marrow-deposit; it is most conspicuous in broad-chested women; after an operation it is often the sole objective symptom of malignant disease. It is found where there can be no suspicion of any direct infiltration; it rarely gives rise to an actual tumor formation. Snow, however, relates a case in which a prominent tumor grew from the sternum, which rapidly ulcerated, forming a round, sloughy sore, three inches in diameter, with livid border and elevated edges. This occurred six years after a scirrhus had been removed. Gariel and, later, Poncet⁴¹⁵ have called attention to the fact that translucency does not necessarily prove a tumor to have transparent liquid contents. This physical property has been noticed in lipomata, hæmatomata, chondromata, cases of tubercular synovitis, and in certain dermoid cysts. Fraenkel⁶⁹ demonstrated 2 cases of carcinoma of the œsophagus, from which he concludes that the size of the metastatic glands are not indicative of the size of the original growth. Cancerous glands in the neck are, in the majority of cases, secondary growths, and when the original growth is not apparent it must be diligently sought in the pharynx, larynx, or in the œsophagus. In doubtful tumors of the neck it is advisable to make a micro-

scopical examination, from which a radical incision is made should it prove to be cancerous. Duret,²²⁰_{Dec. 70} Robinson,²_{Mar. 3} and White,¹⁹_{Jan. 1} have also made communications, in which the same opinions in operative procedure for cancer of the breast are enunciated. Van Beneden²²³_{July} thinks that adenoma and carcinoma are but different conditions of the same process,—epithelial proliferation. The transformation of adenoma into carcinoma seems to depend upon an alteration of the interstitial tissue of the adenoma. These alterations may be due to an extrinsic alteration (inflammation) or to an intrinsic one (sarcoma). Kammerer, in removing large tumors of the neck, divides the sterno-cleido-mastoideus when included in the lower strata of glands; and, furthermore, this procedure facilitates the complete removal of all the glands.

ENCHONDROMA.

Polaillon, of Paris,¹⁷_{Sept. 12} removed a large mixed enchondroma from a man aged 64. The tumor had existed thirty years, and had enlarged slowly and progressively, until it was as large as the two fists. It measured seventeen centimetres vertically and seventeen transversely. The tumor caused great inconvenience, and, on a level with the ear, it had assumed a malignant character; the skin was adherent, very vascular, and inflamed. The pedicle was found imbedded in the parotid, and it was necessary to remove almost all of the gland. The patient was discharged at the end of a month. There remained some paralysis of the facial nerves, for the removal of the parotid makes the division of the nerve imperative; but he was entirely relieved of the tumor, which proved to be an enchondroma with patches of softening, in which the transformation into a malignant growth was clearly shown.

CYSTICERCI.

Israel,²²_{Mar. 26} states that for a long time he had removed small tumors—generally soft—from muscles without knowing how they originated, until the discovery of a slight membrane showed that they were due to cysticerci that had suppurated. He found a large cysticercus in a tumor of the pectoralis major. The muscle was converted into a fibrous substance and showed quite a large cavity.

SARCOMA.

Oppenshaw²_{Dec. 27, '90} excised a scapula affected with sarcomatous growth by a T-shaped incision. The muscles were detached, about forty arteries tied, the bone elevated from below and sawn through at its base, leaving the acromion, coracoid, and articular processes *in situ*. Severe shock followed, but the wound healed in six days, leaving merely a flattened shoulder; the arm movements were free, except rotation outward. Sections of the tumor showed a mixed sarcomatous growth, spindle and round cells. Sixty-five cases of this operation are on record. Lamarque and Labrunie¹⁸⁸_{Jan. 11} had a patient presenting a primitive sarcoma of the anterior rectus of the thigh. It had developed very rapidly, and in one month had reached the size of an apple. There was no pain, nor history of traumatism. The tumor was removed, and found to exist in the very *centre* of the muscle. It was not encysted, but, being diffused, it sent ramifications into the interstices of the muscular bundles. On section, it was found to consist of whitish tissue, of even consistency. On microscopical examination, it was shown to be made up mostly of embryonal round cells, which had infiltrated the muscle, dissociating its fibres, which were seen to be undergoing degeneration.

Wyeth had an interesting case of neurosarcoma of the left supra-clavicular region; six weeks before, the patient noticed a swelling, that grew with great rapidity. A diagnosis of aneurism had been made, but Wyeth excluded this on examination, concluding that the tumor was either a cystic or a fatty growth, or a neuroma. At the operation, the tumor was found to be a neurosarcoma of the brachial plexus. As complete enucleation would have been followed by paralysis of the entire arm, its removal was not undertaken without first obtaining the consent of the patient herself. She was, therefore, permitted to come out of the ether, and no further operative procedures were undertaken.

A remarkable case of sarcoma of the right pneumogastric nerve is reported by Ramoneda.³⁷⁸_{July 23} The patient, aged 35 years, ten years before noticed a small tumor near the angle of the jaw on the right side; at first it developed slowly, and then more rapidly, until it reached the size of a goose-egg. It was movable and hard, the patient coughing each time the tumor was touched. Deglutition showed that there were no adhesions with the

pharynx. A variety of diagnoses were made, and, in spite of advice to the contrary, Ramoneda extirpated the tumor. On being exposed, it appeared encapsulated. After it was incised, its surface was found to be traversed by a voluminous nerve, accompanied by two veins. This nerve was adherent to the tumor, and proved, afterward, to be the hypoglossus. In attempting to detach the tumor from the deeper parts, it was found to be attached to another nerve running vertically, which was recognized as the pneumogastric; this was carefully separated, being but slightly injured in the operation, which was difficult to accomplish, owing to the hæmorrhage and the continued coughing from irritation of the nerve. The pulse seemed wavering, and there was constant fear of a fatal issue. The nerve was denuded to an extent of six centimetres. The tumor extended above to the base of the skull. There was no evidence that the glosso-pharyngeal was involved. The hypoglossal was the last nerve to be dissected out. The wound healed by first intention. The subsequent phenomena were: at first complete aphonia, persistent vomiting, difficulty of mastication, rapidity of the pulse without fever, deviation of the tongue to the right when protruded, anæsthesia of the ear. Three months afterward the patient was being treated for laryngeal paralysis.

HÆMANGIOMA.

Krenn⁸⁸ relates 63 cases of angioma treated by the following measures: 1. Cauterization with pure nitric acid (5 cases). 2. Galvano-cautery needle (3 cases). 3. Introduction of threads imbued with chloride of iron, and injections of tincture of chloride of iron (2 cases). One became gangrenous; the other died, probably from embolism. 4. Thermo-cautery of Paquelin (4 cases). All but 2 got well. The knife may subsequently be used for cosmetic purposes. The treatment of the wound was, in every case, very simple. Those treated with nitric acid were left alone, without dressing, to allow the slough to fall away. After cauterization with the electro- or thermo- cautery, the wound was washed with sublimate (1 to 1000) and covered with iodoform-gauze.

ANGIO-LIPOMA.

Willy Meyer,¹_{Jan. 10} removed a large hanging mass from the cheek of a boy. The relation of part of the tumor to important

structures suggested that it would be better to combine the methods of operating. He, therefore, began the treatment by the use of the actual cautery, applying the same in rows, the remainder of the growth being removed by the knife. Hutchinson⁸⁰⁶ reports 3 cases of diffuse lipomata. After removing as much of the growth as possible, the patients were directed to abstain from beer, to take liberal exercise in the fresh air, to use lean meat and farinaceous diet, and such remedies as liquor potassæ, arsenic, and sulphide of calcium.

Paul Sandler⁸³⁶ observed and operated upon a case of lipoma arborescens of the sheath of the extensor muscles of the hand in the second, third, and fourth fingers, sending out short apophyses; it was in all about three-fourths of an inch in width. The skin over the swelling was normal and mobile. On division of each tendon there escaped a yellow, viscous fluid, and a yellow, loosely-attached substance, consisting of delicate fat globules, appeared, extending toward the metacarpus, in each tendon, as small processes. In eight days the wound was healed.

Chassaignac¹² reports the removal of a fibro-lipoma, weighing about 30 pounds, from the back of a negro's neck. It had been growing twenty-five years. The patient, although 60 years of age, made a complete recovery.

Labbé²² and Crofford⁸⁴⁹ report enormously hypertrophied breasts in girls 14 and 15 years of age. In both cases the breasts were removed and the patients recovered.

HYGROMA.

Benjamin Ipavic⁸⁴ relates a case of congenital hygroma of the left axilla, cured by antiseptic drainage. The patient, a boy aged 2 years, was born with a tumor the size of an apple, situated on the outer side of the nipple. During the first year it grew very slowly. Toward the end of the year a navel-like depression appeared near its middle, and the tumor diminished somewhat. In the second year it grew rapidly and extended into the axilla. An incision four centimetres long was made on the outer side of the cyst, and a tolerably large quantity of yellow fluid, partly blood-stained, was evacuated. A counter-opening was made and a drainage-tube applied. As the whole of the hygroma did not collapse with the first incision, a fresh incision and counter-opening

were made, fifteen days later, and drainage was continued. After two months the cyst had shrunk to the size of a walnut, and the openings had cicatrized.

SURGICAL DISEASES.

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HYDROPHOBIA.

IN view of the fact that nearly seven years have elapsed since the Pasteur method of preventive inoculation against hydrophobia was first practiced on man, and considering, also, that in this time about ten thousand people, bitten by animals more or less certainly rabid, have been subjected to the cord-emulsion injections, it would seem that we might now properly estimate the value of this measure toward the prevention of the disease. That this cannot be done is, however, clearly apparent whenever a review of the current literature on the subject is undertaken. Side by side with arguments which tend to show that the antirabic method of inoculation has distinctly lessened the mortality from hydrophobia are others which deny *in toto* their value against the disease. The reviewer is confronted, year by year, with the same unsettled questions, toward the solution of which we seem even yet to have made little advance.

Whatever the real value of Pasteur's treatment for hydrophobia may prove to be, recent laboratory experiments leave little ground for doubt that it has been instituted along proper lines; and to Pasteur himself the greatest honor is due for having established the possibility of preventing not only hydrophobia, but other infectious diseases as well, by conferring an artificial immunity through the methods growing out of his original investigations.

Pasteur's treatment, now generally understood, consists in successively inoculating bitten individuals with antirabic virus of varying degrees of intensity, until a condition of immunity is produced against the poison admitted with the bite. The value

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of this treatment is estimated by its advocates by comparing the mortality following its use to that of those bitten and not treated at all. Assuming, as is done, that in the latter case from 12 to 14 per cent. die of hydrophobia, the efficacy of the antirabic inoculations cannot be doubted, since in those so treated it has been shown that only about 1 in 100 dies. However, doubt must always exist as to the real number of cases of hydrophobia which follow a given number of bites from rabid animals. Hydrophobia occupies a peculiar position, and is not easily compared with other forms of infection.

Definite diagnostic symptoms are generally wanting, and the possibility of mistaking it for a masked form of some other disease is only too evident. Hydrophobia in man is certainly a rare disease. Many medical men of wide experience, and living in communities where rabies in animals is often encountered, have never seen a case in the human. On the other hand, many cases simulating hydrophobia, and occurring after dog-bites, have been recorded. Very recently 2 such cases have been reported by Mills and Hoban,²⁴²_{Dec., '10} who concluded that they were clearly cases following localized gross organic lesions and not hydrophobia at all. Mills advances a warning, which, if trite, is true, that with ever so suggestive symptoms, following a recent or long-standing dog-bite, we have no right to assume that it is a case of hydrophobia, "but rather, we should carefully exclude other possibilities before hazarding a conclusion so dangerous, directly or indirectly."

Perhaps cases of no other disease are so generally published as are those of suspected hydrophobia, the mere suggestion of the name insuring wide attention and a broadcast report. According to Mills, 19 out of every 20 cases so reported are undoubtedly not instances of the disease at all; and, further, there is a hydropho-hydrophobia, which is the result of these reports. The small amount of actual knowledge which we really possess concerning the disease has come to us through the investigations of Pasteur and his followers. Notwithstanding that up to this time its actual causative agent has not been discovered, nevertheless, hydrophobia belongs clearly to the infectious diseases, and depends, in all probability, on the presence of some micro-organism.

In a paper lately presented to the International Congress of Hygiene and Demography, in London, Roux, of the Pasteur Institute, ⁸¹_{Aug. 20}, ⁵²¹_{Sept.} reviews the results obtained in the last six years by means of the antirabic inoculations. He describes the method which Pasteur used in finding an attenuated virus of rabies, stating that the culture methods by which, in other diseases, the virus could be attenuated, could not be employed in the case of rabies, since its virus has not yet been cultivated on artificial media, and we do not even know its microbe. But, notwithstanding this, "successive generations of the virus of rabies can be obtained in animals; for example, if one inseminates the brain of a rabbit with a particle of the medulla oblongata of a rabid dog, the virus is cultivated in the brain and spinal cord, just as the culture of the bacillus of anthrax is effected in *bouillon* inseminated with anthrax blood. These intra-cranial inoculations can be repeated for an indefinite series, and the rabic virus, thus passing from rabbit to rabbit, becomes so adapted to live in the nervous system of this animal that its evolution proceeds with perfect regularity. In an animal thus inoculated rabies breaks out at a fixed hour, and death supervenes exactly at a foreseen moment. One can thus have, every day, brains and spinal cords that are veritable pure cultures of the rabic virus. When we cultivate the ordinary pathogenic microbes in the artificial media, the aspect of the culture and microscopic examination permit of their purity being verified at any instant; but such is not the case with our rabic cultures in the nervous system of animals. We are assured that they are pure, in the first place, by the regular evolution of the malady; secondly, by the fact that our rabic brains and spinal cords do not show any manifest lesion, and, finally, by the fact that neither microscopic examination nor culture, *in vitro*, reveals anything living."

The rabid spinal cords of fixed virulence are dried at a temperature of 23° C. (73.4° F.), in sterilized flasks containing potash fragments. At first virulent, the virus becomes, day by day, more and more feeble, and, at fourteen days, is inoffensive. The cords for injection are triturated in sterilized *bouillon* "until they are reduced to a state of emulsion so fine as to penetrate the skin easily." The treatment is continued for about fifteen days. It is begun by using the weakest cord, *i.e.*, that of fourteen days.

Next, cords of thirteen and then of twelve days are used, and so on, proceeding from feeble to strong viruses, up to a cord of three days, which completes the immunity.

For ordinary bites not about the head, in which case a more vigorous method is employed, the formula of the treatment is as follows:—

| 1st day, cord of | | 14 days in dose of 3 c.cm. of emulsion. | | | | |
|------------------|---|---|---|---|---------|---|
| | | { 13 | " | " | " | " |
| 2d | " | { 12 | " | " | " | " |
| | | { 11 | " | " | " | " |
| 3d | " | { 10 | " | " | " | " |
| | | { 9 | " | " | " | " |
| 4th | " | { 8 | " | " | " | " |
| | | { 7 | " | " | " | " |
| 5th | " | { 6 | " | " | 2 c.cm. | " |
| | | { 6 | " | " | " | " |
| 6th | " | { 5 | " | " | " | " |
| 7th | " | { 5 | " | " | " | " |
| 8th | " | { 4 | " | " | " | " |
| 9th | " | { 3 | " | " | 1 c.cm. | " |
| 10th | " | { 5 | " | " | 2 c.cm. | " |
| 11th | " | { 5 | " | " | " | " |
| 12th | " | { 4 | " | " | " | " |
| 13th | " | { 4 | " | " | " | " |
| 14th | " | { 3 | " | " | " | " |
| 15th | " | { 3 | " | " | " | " |

In the Pasteur Institute, between 1886 and 1891, 9465 persons have undergone the treatment, and of this number 90 have died of hydrophobia,—a mortality of less than 1 per cent. Roux speaks particularly of bites about the head, the mortality from which, in those not treated, he puts at 80 per cent. He says that of 710 such cases treated by them only 24 died,—a mortality of 3.38 per cent. “The difference between these two figures—80 per cent. and 3.38 per cent.—measures the value of the preventive inoculations.”

Pasteur is cited as thinking “that, together with the modified virus inclosed in the desiccated cords, there exists special chemical products, elaborated by the microbe of rabies, which play a part in the production of immunity,” adding thus, in inoculation, a chemical vaccination to that of the living virus. Roux speaks of the antirabic inoculations as “one of the most striking examples of what the experimental method can do when applied to medical questions,” and exclaims: “How many of the thousands of persons who have been treated owe their lives to the Pasteurian vaccinations!” He concludes that it would be easy to effectually stamp out rabies if the various countries would unite in carrying

out for some months systematic sanitary regulations in reference to the dog.

Two cases of an attenuated form of hydrophobia, occurring during the course of treatment by antirabic virus, have been recently observed,—one by Laveran,⁸ the other by Chantemesse.⁸ The case described by Laveran was almost certainly one of hydrophobia. The patient was not hysterical, not at all suspicious, and did not present the symptoms generally looked for, but rather muscular weakness, hyperæsthesia, etc. The inoculations were suspended for the time being, and, under morphia and chloral, the patient recovered. Laveran discusses the probabilities in the case, and concludes that the symptoms were not caused by the injections, but followed the original bite, and that the poison was attenuated and the cure made possible by reason of the preventive treatment. With this, and like cases, as a text, the argument is now advanced that hydrophobia in man is not necessarily fatal, but that, under some circumstances, its virus may be so attenuated that, even although established, a cure is possible.

Babes, of Bucharest,⁶ a pupil of Pasteur, has recently experimented with the blood-serum of dogs made immune to hydrophobia, injecting it into the abdominal cavities of those bitten by mad wolves, and in whom the cord-emulsion inoculations are not usually successful. Of 27 cases so treated, 3 died of hydrophobia, 2 having symptoms before the inoculations were used. The rest were apparently cured, and the conclusion was reached that “these experiments showed that such inoculations had a prophylactic effect, even in cases in which Pasteur’s spinal-cord lymph, under otherwise quite identical conditions, produced no such results whatever.”

In the same line, Tizzoni and Schwarz⁵⁸⁹ give the outline of a series of experiments on rabbits and dogs, undertaken to discover the active principle which conveys immunity on vaccinated animals; to determine if the serum of these animals can transmit immunity to others not so vaccinated; and, finally, to know whether the serum of vaccinated animals, besides conferring immunity, can also cure animals already infected, if given during the incubation period. Their conclusions are, that the serum of vaccinated rabbits can destroy the activity of the virus of rabies,

retaining its power for some days, if kept at a low temperature. Besides this, it distinctly confers immunity not only against subcutaneous, but also against intra-venous and subdural inoculations. The immunity could, however, not be conferred to a third generation of rabbits, and was altogether less, both in degree and duration, to that conferred by direct vaccination. The experiments in dogs were much less satisfactory. According to these authors, the active principle contained in the serum is non-dialyzable, is precipitated by alcohol, and is either a globulin or something precipitated along with a globulin. It is not identical with that which confers immunity against tetanus infection. One experiment suggested the possibility of cure. In this, 5 cubic centimetres ($1\frac{1}{8}$ drachms) of serum from a highly-vaccinated rabbit saved another rabbit, on being injected twenty-four hours after inoculation, it being, as far as is known, the first time that a rabbit has failed to die after an injection with the virus of rabies, to which it is peculiarly susceptible. These results harmonize perfectly with what is known of immunity against other infectious diseases, notably tetanus.

SEPSIS.

Notwithstanding the enormous and generally recognized importance of a definite appreciation of the causes and effects of the various septic processes in the body, it must be admitted that, even at this time, our actual knowledge of these processes is still small, and that, while numerous theories exist to explain any of the phenomena of infection, facts are not nearly so obtainable; and even apparently established facts are often enough proven fallacies when submitted to renewed and more extended investigation. This limited knowledge depends not at all on any lack of intelligent attention to the subject, for it receives year by year the most careful consideration from the most capable observers, but is obviously due to the inherent complexity of the subject itself, which, once understood, would markedly simplify our knowledge not only of surgical pathology, but general pathology as well.

In the consideration of the so-called septic processes, we have to deal not only with the primary wound-infection itself, with the agents which infect, and the methods and results of their infection, but also with the conditions which underlie this infection,—conditions of soil, of local and general tissue susceptibility and resist-

ance. So, too, as closely associated with this, we have to consider the causes and possibilities of immunity against infection, and the part played by the so-called antiseptics in excluding the presence and destroying the power of the infecting materials. To all of these subjects, during the past year, much attention has been directed, but it cannot be said that from the accumulated literature much real advance is to be noted. Most knowledge concerning diseases comes slowly, and that of wound-infection is no exception to the rule. However, the results obtained in the treatment of wounds, following the application of such knowledge as we now possess concerning infection and the means for its prevention, much more than compensate for the labor expended on the subject, and, having already revolutionized surgical practice, encourages us to look forward toward the attainment of even better results.

Perhaps the most valuable summary of the year on wound-infection has been given us by Welch,⁵ in a paper before the Second Congress of American Physicians and Surgeons, at Washington, in September. After accepting as proven the presence of certain bacteria as the underlying cause of infection in wounds, he notes as the germ most frequently present in frank suppurations the staphylococcus pyogenes aureus. Besides this and the pyogenic streptococcus, which he does not distinguish from that of erysipelas, he describes a certain white staphylococcus, met with very frequently in "small-stitch abscesses and in the slighter grades of inflammatory disturbance of wounds treated antiseptically and aseptically."

This germ has heretofore been considered identical with the staphylococcus pyogenes albus of Rosenbach, but seems to differ from that organism, as generally described, in being less virulent and behaving differently in various nutritive media. To this organism Welch has given the name "staphylococcus epidermidis albus," from the fact that it is generally and almost constantly encountered on skin surfaces. From its tendency to lodge in the deeper epithelial layers, it may be found very difficult or even impossible to destroy by the ordinary methods of cutaneous disinfection. This noteworthy fact is of less grave significance than it appears, because the germ does not seem to be present in the more serious forms of suppurative inflammations, except when associated with some other pyogenic organism.

In addition to the pus-forming micrococci, Welch considers that "the list of bacilli which may be concerned in suppurative and other inflammatory affections is much longer than was formerly supposed, and is likely to be further extended." He cites various examples of bacillary infection, and notes especially that of the *bacillus coli communis*, the investigation of which has received considerable attention at his hands. He has found this bacillus, under circumstances indicating its pathogenic action, in 4 cases of perforative peritonitis; in 2 cases of peritonitis secondary to intestinal disease without perforation; in 3 cases of circumscribed abscess, and in 6 laparotomy wounds. It seems always to escape through an evident lesion of the mucous membrane, in this way serving to illustrate the possible predisposition to infection afforded by intestinal lesions, and furnishing, also, an example of the heretofore questioned auto-infection. In other cases of intestinal lesion the same germ has been frequently encountered in different organs without evidence of any pathogenic activity.

Welch considers as proven that the pyogenic organisms excite suppuration by reason of their produced chemicals, and, even although the bacteria themselves are dead or removed, their chemical products seem still able to exert their activity. Suppuration itself may prove often beneficial to the affected individual. By the formation of pus the bacteria concerned may be effectually combated, being, perhaps, starved or disposed of by the accumulated leucocytes (phagocytes), or, at any rate, prevented in one way or another from further invasion of the tissues. It is a well-known fact that cultures of the pyogenic micro-organisms have been injected time and again, in different quantities, into healthy animal tissues, without exciting any pathological disturbance. The resistance displayed by the peritoneal cavity against these bacteria is especially remarkable. Nevertheless, very small numbers of the organisms may, under some conditions of increased virulence, produce suppuration, which is further favored by the presence of a foreign body, or, indeed, anything which interferes in any way, either chemically or mechanically, with the vitality or integrity of the tissues.

The influence of chemical irritants in predisposing to suppuration in wounds where pyogenic bacteria gain entrance is mentioned by Welch, who also cites Halstead's observation of the

superficial necrosis following sublimate irrigation, in solution as weak as 1 to 10,000. The natural conclusion is reached that "the tissues of a wound should be handled so as to interfere as little as possible with their vital capacity to overcome bacteria." Some experiments in his laboratory on the inoculation of cultures of the staphylococcus aureus on blood-clot in dogs tended to confirm certain clinical observations in the human, inasmuch as, although the implanted organisms remained alive for a considerable time, they did not multiply nor produce suppuration, nor in any way interfere with the organization of the clot or the healing of the wound.

Park considers blood-serum the probable ideal antiseptic, and, while experimentally it does not destroy pus cocci as it does some other bacteria, if it prevents even partially the multiplication of invading organisms and destroys their toxic power its value is apparent.

The question of immunity against pyogenic organisms is but little understood. As bearing upon this, Welch cites the experiment of Roger, who found that the streptococcus of erysipelas would grow in the blood-serum of rabbits in whom immunity had already been produced against the disease, but that under such circumstances it was no longer virulent; and he says that, "as we now know the protective influence of the blood-serum of immune animals consists quite as much in the power to destroy the poisons produced by bacteria as in the power to destroy the bacteria directly, it is not unreasonable to suppose that the antidotal capacity of the blood and animal fluids may be one of the means employed by nature to dispose of the pyogenic cocci." In his summary of conclusions, Welch says: "The effects produced in the animal body by the pyogenic cocci are determined by many factors relating to the infectious agents and to the individual exposed to infection. There are differences in these effects, depending upon the species of animal, upon the tissues and part of the body infected, upon the readiness of absorption from the infected part; upon the source, the number, and the virulence of the organisms; upon the nature and amount of the toxic substances accompanying and produced by the bacteria; upon general predisposing conditions of the body, and upon local conditions in a wound, such as the presence of foreign bodies, of pathological

products, of dead spaces, of bruised, necrotic, and strangulated tissue."

The part played by so-called antiseptics in favoring wound infection has already been mentioned. Abbott's investigations⁷⁶⁴ on the action of corrosive sublimate against the staphylococcus pyogenes aureus have demonstrated that as a germicide its effects are uncertain, and dependent on "the proportion of albuminous material contained in the medium in which the bacteria are present," and "that under the most favorable conditions a given amount of sublimate has the property of rendering inert only a certain number of individual organisms." He concludes that the albumen present in the tissues and fluids of the body serves to markedly weaken or render inert the solutions employed on wound surfaces, and, further, that the integrity of the tissues may be materially injured by the application of the sublimate solution. Clinically, tissue-necrosis and delayed union following the use of corrosive sublimate has been often noted.

In this connection, Welch,⁵ announces that chemical disinfectants have no place in fresh, healthy wounds. Heat is by far the safest and most certain disinfectant whenever it can be used, and chemical means are, at best, not nearly so certain.

Recent experiments in the Johns Hopkins Laboratory and elsewhere on hand disinfection have shown that corrosive sublimate may be demonstrated on hands, by precipitation with sulphide of ammonium, at least six weeks after contact with a mercurial solution. By this precipitation deeply situated bacteria may be liberated, having been, perhaps, held by albuminous combinations with the mercury salt. Thus, immersion into strong solutions of corrosive sublimate may inhibit, but will not kill all the bacteria present.

Following a long series of experiments, Welch announces that the best results in cutaneous disinfection have been reached where, in addition to soap and hot water and corrosive sublimate, permanganate of potash and oxalic acid have played principal parts. It seems, after all, however much to be desired, that we cannot hope with our present methods to render operative fields sterile for any length of time. The production of absolute disinfection of skin surfaces in both patient and operator is extremely difficult, and, perhaps, often impossible. Nevertheless, with our faith in

antiseptics shaken, we are properly driven more and more toward the attainment of an ideal asepticism in our surgical procedures. Fortunately, the most stubborn surface-germs (*staphylococcus albus*) seem but little likely, under ordinary circumstances, to cause trouble, and besides, we may trust with considerable confidence to the peculiar resisting-power of healthy tissues for destroying such organisms as may escape us.

Roswell Park,⁵ in an admirable paper read before the same association, speaks of sepsis as "a condition of poisoning by ptomaines, toxines, and albumoses, having widely varying strength and properties, some of which are so antagonistic in physiological action that one may often neutralize another." Some of these poisons are harmless in their proper places, but deadly in others; and, further, "the chemical processes going on within our bodies are as complex and as difficult of appreciation as are those mental processes which so bewilder us, when, sometimes, we endeavor to study and read the character of various individuals. Were the truth concerning all the details of our body-chemistry known, we should see in every human being a laboratory, in which are going on more processes of manufacture and destruction than can be witnessed even in a World's Fair."

Park devotes considerable attention to the widely discussed subject of chemotaxis. This term has been used to express the "peculiar property possessed by bacteria of moving toward or away from substances which either attract or repel them," and, while at first applied to bacteria alone, is now made to include various other unicellular organisms, notably the leucocytes. Several substances are mentioned which excite repulsion in leucocytes,—for example, solution of lactic acid, 10-per-cent. salt solution, quinine, chloroform, glycerin, and bile. On the other hand, various proteid substances powerfully attract the leucocytes, and this attraction is especially marked toward bacterial cultures. Indeed, this attraction between bacteria and leucocytes seems mutual, and may be exerted by the produced products (proteid) of bacteria, although the organisms are themselves dead.

Park is a pronounced believer in the doctrine of phagocytosis, and cites the demonstration of Buchner that the phagocytic action of the leucocyte "is but a part of that general power, which it possesses, of responding to chemotactic attraction, and incorporat-

ing into itself whatever there is of foreign, dead, or offending material, and then removing it."

The peculiar antitoxic properties of blood-serum are also discussed in this paper, and the fact that it may destroy the produced poisons without killing the bacteria themselves is particularly noted. Park insists in the most emphatic manner on the fact that many cases of sepsis originate elsewhere than through the wound itself, although this may soon show changes. He gives as the general sources of possible infection, which may exist independently of the condition of the wound itself, previous anatomical changes,—as old age, inherited diatheses, chronic or acute nephritis; various examples of recent and long-standing toxæmia; such conditions as starvation, scurvy, and anæmia; conditions of environment, and the effects of anæsthetics and antiseptics.

The various results of the absorption of the products of wound infection have been clearly expressed by Park⁹⁶ in one of the series of Mütter lectures given by him during the year. Surgical fever—the fermentation fever of Bergmann—has, according to the author, nothing to do with sepsis, but follows the absorption of the products of aseptic tissue-necrosis. This is that form of innocent pyrexia, with associated digestive and emotional disturbance, frequently encountered in the first two or three days after an injury or a wound. Sapræmia is a term limited to the designation of such poisoning as results from the absorption of putrefying materials contained "within a body-cavity, and yet not involving the living tissue of that body." This form of poisoning is such as results from the absorption of the putrefactive products of an infected blood-clot *in utero* after labor, or in the stump of an amputated limb, or other surgical cavity. When, in these cases, the cause of infection is removed, rapid recovery is the rule.

In septicæmia the infecting material has spread to the tissues themselves, thus differing from sapræmia more in location than in character. This infection sometimes succeeds a sapræmia, but may be septicæmic from the beginning. Pyæmia is distinguished from septicæmia by "the formal progression of a series of embolic disturbances, which give rise to the formation of metastatic foci and abscesses." That which determines these disturbances, giving rise to the formation, and, afterward, to the dislodgment and trans-

portation of minute thrombi, is not definitely understood. Of course, the whole subject of sepsis has to do with the study of those different forms of infection.

To the ordinary group of septic disturbances resulting from injury or wound Park adds intestinal toxæmia, under a distinct heading. This author is already recorded as insisting on the frequent occurrence of sepsis arising from other conditions than exist in the wound itself, and this intestinal toxæmia is regarded as especially important.

Besides the infections which are known to follow the departure into the tissues of bacteria, which are commonly or uncommonly encountered in the intestinal canal, and which, although there harmless, may produce disease by a new activity under new surroundings (*bacillus coli communis*). Park includes "a condition of unusual, or at least undesirable, activity in the contents of the alimentary canal, by which, whether due to common or specific forms of bacteria, the ptomaines of putrefaction are produced in such manner or such quantity that they are absorbed through the intestinal mucosa and distributed over the body." In this way a form of intoxication is produced, which yields usually to a brisk cathartic; but which, undisturbed, naturally, or otherwise, may lead to serious results. Certainly, as the result of the detention in the alimentary canal of excrementary material, associated or not with constipation, there may be brought about "a condition of pyrexia, of disturbed secretion and excretion and brain action, and of wound-healing, which may at times be mistaken for sapræmia or septicæmia"; and may, indeed, under favorable circumstances, be converted into one or the other of these forms of infection. This same subject has been considered recently in a paper by Périér,⁵ of Paris. He advises brisk purgation on the appearance of fever after operation, even though the patient is distinctly weak, and uses, under such circumstances, stimulants side by side with the purgative agent.

Anton Freiherr von Eiselberg,⁴ reports the interesting discovery of pyogenic cocci in the sweat of a man who was the subject of pyæmia following osteomyelitis of the femur. This patient's forehead was very carefully disinfected, and from the exuding sweat cultures were made on agar and gelatin. In most of the tubes no growth appeared, but in several instances,

with agar as the medium, pure cultures of the staphylococcus aureus were obtained. These experiments were confirmed by being repeated several times with the same result. The patient dying, the staphylococcus aureus was found generally distributed in the pus at the original seat of trouble, in the metastatic abscesses, and even in the blood. From these observations it would seem that the pus cocci may be present in the sweat, and, indeed, be excreted from the body with it. In this way may be explained the improvement so often noted as following excessive sweating in cases of septic infection. In our present state of knowledge it is by no means easy to give a clear definition to the term "pus." Senn²⁰⁶² defines it as "the liquefied product of suppurative inflammation," and Park⁹⁶ as "a mixture of originally good cellular materials, infected and gone to the bad, suspended in fluid more or less albuminous, and containing at times adventitious substances." Park gives an interesting description of abscess formation, and says: "That, clinically at least, we have no suppuration, except such as is produced by bacteria." The so-called aseptic pus, as that produced experimentally in animals by inoculations of certain chemical substances, is, in the same sense he means, not pus at all, because "it lacks the essential pathogenic and noxious elements of pus,—the micro-organisms, which confer upon it its infective and toxic properties." Such material he calls "puruloid," because of its resemblance to true pus, and he includes under this term all pus-like collections where the vital activity of cells, bacterial and other, has subsided. To the thickened contents of cold abscesses and to the semi-solid caseated material which was once pus, wherever found, he suggests the title, "archepyon," i.e., "originally pus."

Ranvier³¹, has recently expressed the opinion that diapedesis alone is not sufficient to account for the rapid production of large quantities of pus. Within twenty-four hours after the injection of a solution of nitrate of silver (3 to 1000) into the peritoneal cavity of the rat he has found large numbers of embryonic cells (leucocytes) and intermediate forms, but very few of the ordinary cells (clasmatoocytes). He considers that, because of the irritation, the clasmatoocytes have reverted into their embryonic forms, and, becoming leucocytes, have multiplied by simple fission. Ranvier holds that the function of the pus-cells is to eliminate the

necrosed cells destroyed by the irritant, thus cleansing the wound and favoring the processes of repair. Confirmatory to this observation, it was noticed that if the animal lived for three days after the injection nothing was found in the peritoneal cavity.

M. M. Kuznetzoff, ⁶⁹⁶_{Oct., Nov.} of Kharkov, has written an interesting article on the subject of blue suppuration, which he has considered from both clinical and bacteriological stand-points. He had observed in Grube's clinic, within two years, 18 cases showing blue pus, its first appearance being in a man upon whom an excision of the scapula had been done for malignant disease. Two other cases followed the first after a few days, and later the disease extended elsewhere. He claims that the ordinary belief that blue suppuration should be considered a trivial wound complication is altogether wrong, but rather that it constitutes a serious infection, markedly contagious, and tending to distinctly delay healing in wounds. On this account, he advises that prompt and painstaking measures be taken to disinfect wounds, the seat of this suppuration; and he has successfully employed for this purpose the ordinary solutions of corrosive sublimate, chloride of zinc, and carbolic acid. In the reported cases the peculiar pus always appeared suddenly, and its onset was usually associated with some elevation of temperature and general bodily disturbance, more or less proportionate to the intensity of the discoloration. The discharge persisted for a variable time, until definite measures were used to destroy it; was of a greenish, rather than bluish color, and could always be recognized by a specific aromatic odor, described by the author as resembling that of the "blooming bird-cherry."

Following his bacteriological investigations, the writer announces that there are two distinct organisms capable of inducing this condition, acting either separately or together. They are both bacilli, both aërobic, and both, of course, chromogenic. Of the two bacilli, the so-called bacillus pyocyaneus (Ernst's C., pyocyaneus B.) seems more active than the bacillus pyofluorescent (Ernst's C., pyocyaneus X.). In dogs and rabbits subcutaneous injections of pure cultures of either cause local infiltration, inflammation, and suppuration, while large injections frequently produced high fever and prostration, and sometimes death. When

injected into venous channels an acute intoxication was produced, ending in death in from thirty to forty-eight hours; when injected into the peritoneal cavity, death also followed after the production of a general hæmorrhagic fibrinous peritonitis. Inoculations of cultures deprived of their microbes also manifested the peculiar activity of the germs, but in a lessened degree.

Abbott⁹ has very recently revised the whole subject of immunity and infection. He formulates in his article the various existing doctrines accounting for the production of immunity, and, reviewing the results of experimental work in this direction, formulates the following conclusions:—

1. That, of the hypotheses that exist for the explanation of immunity, that which assumes acquired immunity to be due to reactive changes on the part of the tissues has received the greatest support.

2. That immunity is most frequently seen to follow the introduction into the body of the products of growth of bacteria, that in some way or other have been modified. This modification may be artificially produced from the products of virulent organisms, and then introduced into the tissues of the animal; or the organisms themselves may be so treated that they are no longer virulent, so that, when introduced into the body of the animal, they eliminate poisons of a much less vigorous nature than is the case when they possess their full virulence.

3. That immunity following the introduction of bacterial products into the tissues is not the result of the permanent presence of these substances *per se* in the tissues, or to a tolerance acquired by the tissues to the poison, but is probably due to the formation in the tissues of another body that acts as an antidote to the poisonous substance.

4. That this protecting proteid that is eliminated by the cells of the tissues need not of necessity be antagonistic to the life of the organisms themselves, but, in some cases, must be looked upon more as an antidote to their poisonous products.

5. That in the serum of the normal circulating blood of many animals there exists a body that is capable, outside of the body, of rendering inert bacteria that, if introduced into the body of the animal, would prove infective.

6. That, in many instances, infection may be looked upon as

a contest between the bacteria and the tissues, carried on on the part of the former by the aid of the poisonous products of their growth, and resisted by the latter through the agency of proteid bodies normally present in their integral cells.

7. That, when infection occurs, it may be explained either by the excess of vigor of the bacterial products over the antidotal or protective proteids eliminated by the tissues, or by some cause that has interfered with the normal activity and production of these bodies by the tissues.

8. That phagocytosis, though frequently seen, is not essential to the existence of immunity, but is more probably a secondary process,—the bacteria being taken up by the leucocytes only after having been rendered inert through the normal germicidal activity of the serum of the blood and other fluids of the body.

TETANUS.

The literature of the year concerning tetanus has to do largely with the questions of immunity and infection, to which we have already directed attention. Tetanus is clearly an infectious disease, resulting from the absorption into the body of a certain poison or poisons produced by a definite anaërobic microbe,—the tetanus bacillus. This germ has been made the subject of much study, and, although the investigations of Nicolaier, Rosenbach, and others had about established its importance as the actual cause of tetanus, this knowledge was only made definite when Kitasato succeeded in isolating the organism from tetanic pus, and produced in animals, by inoculations of the cultures, the identical disease. Continuing his investigations, Kitasato, ⁶⁹_{Dec. 4, '90} together with Behring, at the end of last year, published some experiments, which seem to show that in animals at least, by the inoculation of certain chemicals, immunity against the tetanus infection may be secured; and, further, that the blood of these animals, made immune against the disease, may have the effect, when injected into other animals, not only of preventing infection, but even of curing the disease when it is very definitely established. Besides this, the blood-serum from such immune animals, when brought into direct contact with the poison of tetanus outside the body, completely destroyed its toxic properties.

These investigations are exciting universal attention, especially

as they indicate a possible line of treatment for the disease. The first report of an experiment in this direction on the human has been given us by Baginsky,⁴ our corresponding editor in Berlin. The case was a baby 9 days old, with well-marked trismus neonatorum occurring on the eighth day after birth. Other measures having brought no relief, the child was admitted to the hospital, and received an injection of $\frac{1}{10}$ cubic centimetre ($1\frac{1}{2}$ minims) of blood-serum from a tetanus-immune rabbit. In all, six injections were given, each injection being followed by a distinct rise in temperature. Although some transient improvement was noticed coincident with the treatment, the tetanic spasms were not checked, and the child died on the third day after admission. Baginsky thinks that in this case the amount of injected serum was much too small, and that better results might have followed more vigorous treatment.

One of the most interesting contributions of the year on the pathogenesis of tetanus has been given us by M. Vaillard and Vincent.²⁰² By using a modification of Kitasato's method, they obtained from tetanic pus pure cultures of the bacillus, studying afterward its growth and properties. Growing on gelatin in a vacuum, they found that after a few days gas-bubbles would collect about the colonies, and after ten or twelve days the gelatin became liquefied, giving off a peculiar odor. Under the microscope the characteristic brush-shaped germs were seen, together with the rods without heads and the long filaments. The organism grew best at a temperature of about 38° C. (100.4° F.), and, although originally anaërobic, could be made to grow at some stages in the presence of a small quantity of oxygen. According to these authors, young cultures of the germ are non-toxic, the bacillus requiring a certain time in which to develop its peculiar poison. Pathogenic properties are only manifested after some days, the typical poison being formed at the time of the changes in the culture medium. The cultures were found to increase in toxic activity until the tenth day, and the poisonous property could be much intensified by passing a fluid culture through a Chamberland filter. Successive filterings produced an extremely toxic fluid, one hundred thousandth of a cubic centimetre ($\frac{1}{84000}$ grain) of which was sufficient to kill a mouse. This poison seems only liberated from the germs in the presence of fluid, is of the

nature of a diastase, peptonizes gelatin, and acts in extremely small doses.

The authors state, as a reason for the many negative results in inoculation, that such young cultures are used that the poison is not formed and the inoculated germs are rapidly destroyed in the tissues. In their hands, even the spores, if thoroughly washed, gave rise to no symptoms on injection, although, if the tissues had been previously bruised or lactic acid had been first injected, or if the inoculation had been made in the presence of some other non-pathogenic organism (*prodigiosus*), the animal would always succumb to tetanus. The authors conclude that, if the injected organisms are deprived of their poison, they rapidly fall victims to the leucocytes; but if, on the other hand, the leucocytes are paralyzed by the presence of the poison or other devitalizing influence, the bacilli have the opportunity for developing just as they would in an artificial medium,—the poison is absorbed, and the animal dies of tetanus.

Sanchez-Toledo,³ has recently repeated the experiments of Vaillard and Vincent, and has obtained contradictory results. Pure cultures of the bacillus were subjected to a temperature sufficient to destroy the toxines, as was proven by control experiments; nevertheless, the cultures remained active, and, in injected animals, produced fatal tetanus in every case. Other cultures were freed from toxines by washing them through the Chamberland filter, in the manner described by Vaillard and Vincent. These, also inoculated into animals, promptly brought about tetanus and death. This observer constantly encountered the specific bacillus in the inoculation wounds and often in pure cultures, no other micro-organism being found. The conclusion is reached that the tetanus bacilli alone, although freed from its toxines and without other bacterial agency, may still, on inoculation, produce tetanus. We will not attempt to reconcile the marked differences between these observations.

Notwithstanding the large amount of individual investigation on the subject, we are as yet unacquainted with the exact nature of the essential poison of tetanus. The alkaloid substances obtained by Brieger, in his early experiments with meat-broth cultures of the germ, cannot account, with our present knowledge, for the peculiar virulence of the poison manifested under some

conditions. Brieger himself has recently isolated a special toxic substance, of an albuminous nature, which he now regards as the essential poison, and numerous experiments in the same direction have rendered it probable that the toxine of tetanus is a proteid material, elaborated by the germ of the disease and closely allied to the albuminoid substance derived by Brieger from diphtheritic virus. Tizzoni and Cattani⁵⁰ have recently obtained, from gelatin cultures of the bacillus, a substance which seems to differ in some respects from the toxalbumen described by Brieger. These authors regard the toxic agent as a soluble ferment, for the reason that (1) it is not formed in those nutrients where the bacillus produces no peptic ferment; (2) acids and heat render both the virus and the contained ferment inert; (3) it is soluble in glycerin, altered by mineral acids, and is operative in minimum doses.

These authors have also attempted to study the substance which renders the blood of immune animals capable of destroying the tetanic virus when injected into other animals. For this substance, not yet isolated, they propose the name antitoxine, and claim that it is of an albuminous nature, non-dialyzable, and weakly resistant to heat. These experiments, while interesting, seem as yet only suggestive.

Verneuil³⁶³ has, in a recent article, applied the term "tetaniferous" to those individuals who may convey the virus of tetanus to others and remain themselves unaffected by the disease. According to this author, the healthy human may for the time being have in the saliva the germs of tetanus, and a bite from such an individual at such a time may inoculate the bitten person. A case of this kind is cited. He further says that the veterinarian or surgeon may act as a carrier of the poison, being capable of conveying the disease to any one with a wound or abraded surface with whom he may come in contact, or even to himself, by auto-inoculation. Besides the horse,—whose secretions, excretions, and surroundings are all considered factors in the propagation of tetanus,—man must also be thought of as a source of possible infection through the same agencies.

During the year there have been reported various cases of so-called cephalic or hydrophobic tetanus. Brunner, of Zurich,⁴ includes under this heading all those cases of spasm resulting from tetanous infection through wounds in the region of the twelve cranial

nerves. As the result of an infection through this area, there has been noticed a group of symptoms which distinctly separate this condition from tetanus as ordinarily seen. Two forms of the disease are encountered,—one without paralytic symptoms and the other with more or less well-marked paralysis. Local muscular spasms—rarely seen in ordinary tetanus—form the characteristic symptom of the cephalic variety, which is further distinguished by the fact that the spasms often remain local, not tending generally to involve the rest of the body. The disease is almost always fatal.

Roberts,⁶_{July 11} reports a case of cephalic tetanus with paralysis, and reviews the reported cases of the affection. Van Spanje⁵⁸⁸_{Sept. 5} also describes a case having distinct hydrophobic symptoms. It is rather noteworthy that both of these cases occurred in men of about 60 years,—both in gardeners,—and that the disease in each case followed infection through slight wounds of the face from pointed sticks.

Camara Pestana,³_{July 1} has undertaken to study the diffusion of the poison of tetanus in the body. For this purpose he made subcutaneous injections of the filtered pure cultures of the bacillus into guinea-pigs. The cultures employed contained no foreign matter and were very virulent. Mice were used afterward to determine the toxicity of the different organs of the inoculated animals. The conclusions drawn by this author are as follow: (1) the toxine of tetanus is absorbed by the blood; (2) the lungs, the spleen, the kidneys, but principally the liver, absorb from the blood the toxic principle and retain it; (3) the toxine is not excreted in any appreciable amount in the urine; (4) notwithstanding the marked predominance of neuromuscular phenomena in tetanus, it is impossible to demonstrate the presence of the toxine in the nervous tissues and muscles, all experiments to that end with these tissues having given negative results.

In the treatment of tetanus we have little new to record. The remedial agents upon which we still place our principal reliance are notably deficient and unsatisfactory. Numerous experiments have been made with chemicals to test their action toward weakening or destroying the poison of tetanus, but they have not indicated a remedy for the relief of the disease in man. We may mention, however, that Pirroni,⁵⁸⁹_{Feb. 5} Francesco, Gancel, and Frache²⁴³_{Sept.} and others have published cures following the vigorous employ-

ment of hypodermatic injections of carbolic acid, after the method first described by Baccelli. Our hope for the discovery of a cure for tetanus in man lies in the knowledge of the fact demonstrated by Kitasato that the blood-serum of animals immune to tetanus may, when injected into other animals, prevent infection, and even cure the disease already established. We may believe that in this line of treatment for infectious diseases we are in the morning of a most promising day, the possible good results which may follow an extended knowledge of curative inoculations against disease being only equaled by the enormous difficulties which now impede our progress toward the attainment of that knowledge.

TRAUMATIC NEUROSES.

By J. A. BOOTH, M.D.,
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NOTWITHSTANDING the papers presented, the number of cases reported and the discussions that have taken place, a review of the literature of the past year on this subject does not show any marked advance. There are no new points, but old ones are constantly debated. The subject seems to be attracting less attention, though a number of interesting cases have been recorded and a certain amount of experimental work has been done, both here and in Europe. The frequency of limitation of the visual fields and the question of its simulation has been pretty thoroughly discussed, more especially in Europe. There now seems to be less disagreement concerning the proper classification of this symptom-group, and we now hear less of "railway brain" and "railway spine." Papers on the general subject of traumatic neuroses were presented at the Berlin Society of Psychiatry and Nervous Diseases, the International Medical Congress at Berlin, the Society of South German Neurologists and Alienists, the Association of Medical Superintendents, the New York Neurological Society, the American Medical Association, the American Neurological Association, and others.

Semeiology and Diagnosis.—Dercum, of Philadelphia,²⁴²_{July} read before the New York Neurological Society an excellent and most practical paper entitled "The Back in Railway Spine," in which he calls special attention to the physical condition of the back in these cases. A thorough examination by superficial and deep pressure, by palpation and percussion, was advised, and the various tests for eliciting pain and spasm minutely described. Seppilli, of Italy,⁵⁹¹_{Jan. 11} gives a very complete and interesting review of the present literature. The symptoms and diagnostic points of hystero-traumatic paralysis are clearly stated and described. The following are given as serving further to establish the hysteric nature of

paralysis: Disturbances of sight, monocular polyopia, the non-participation by the face in the paralysis, sensorio-sensitive hemianæsthesia, convulsive fits, and hysterogenous zones.

Activity is still maintained in discussing the value of different symptoms and simulation. In a paper read before the Society of South German Neurologists and Alienists, Schultze⁶⁹, details 12 cases which he had examined since the Berlin Congress, in all but 2 of which he had found the field of vision perfectly normal. According to Schultze, this symptom is of no significance in traumatic neuroses. Anæsthesia was demonstrated in only 1 case. In 4 cases he observed Ménière's symptom complex; in 1 case, chorea after lacerated wound of the right hand; in 1 case, simulation; in 4, aggravation. Oppenheim⁶⁸ defends himself against the attacks of various authors, and, on the ground of six years' observations, concludes that (1) traumatic neuroses occur frequently; (2) no importance is to be placed on the diagnosis of simulation unless the physician is acquainted with diseases of the nervous system; (3) the diagnosis should not be made on the ground of a single examination; (4) the narrowing of the visual fields, the anæsthesia, the acceleration of pulse and psychic anomalies can only be simulated by a well-taught impostor. It is no proof of simulation if the trembling ceases when the patient's attention is withdrawn. The possibility of simulation is to be considered in every case. Typical concentric narrowing of the visual fields cannot be simulated.

Schultze³¹, gives results of examination in 12 cases; in 10, with undoubted organic and functional disturbances, the field of vision was perfectly normal. George Guth⁸⁶⁶ calls attention to the frequent occurrence of the contractions of the visual field, which in cases of unilateral appearance of other symptoms is greater on the corresponding side. He denies that functional cardiac irritability is due to the presence of the physician, and the possibility of a voluntary acceleration of the pulse. Bruns, of Hanover,¹³ Apr. 15, carefully reviews the whole subject. From a large number of cases he is convinced of the diagnostic value of anæsthesia and limitation of the visual fields. Of 8 cases there was pronounced anæsthesia in 6; repeated examinations for two years demonstrated the persistence of this symptom. In all the anæsthesia was most marked, resisting the faradic brush even with the strongest currents. This symptom, regarded as characteristic by Oppenheim, was found in

only 1 of the 12 cases reported by Schultze, and here in the form of a hemianalgesia over the entire affected side, the origin of which was mainly due to psychic disturbances. In 18 cases Freund found narrowing of the visual fields present in 10. In 3 cases there was hemianosmia and also loss of taste on one side. Dubois states that the concentric narrowing of the field of vision cannot be simulated. Hoffmann succeeded in proving 1 case a simulator who had narrowing of the fields of vision, tremor, and color-blindness. It has been cited as a proof of simulation that on testing at various distances there is no corresponding apparent change in the size of the fields of vision; but this decision rests upon a false supposition, and, according to Oppenheim, the reduction of the field in functional neuroses is governed by altogether different laws from those operating in organic brain disease. Some patients (with whom there was no question of compensation) who had contraction of the visual fields showed no expansion thereof when placed at a great distance from the perimeter. In the testing of cutaneous sensibility contradictory statements on the part of the patient are not necessarily regarded as symptoms of malingering. Oscar König, of Breslau,⁶⁸ explains the use of perimetry in discriminating between real and simulated cases of traumatic neuroses. He thinks capability of fixing steadily and giving correct information as to point of disappearance and reappearance of test object in field of vision is possessed by most people, if only they are clearly instructed as to what is wanted of them in this examination. Pflüge also believes that accurate perimetric examination is an important auxiliary in the differential diagnosis between traumatic hysteria and simulation, and that typical narrowing of the visual fields can be as little simulated as zonular defects of sensation. Moebius is of the opinion that persistent narrowing of the visual fields is a sign of hysteria. During the year Seeligmüller and Hitzig⁶⁹ July 30 have had quite a controversy concerning the frequency of simulation and the examination and treatment of cases of traumatic neurosis. Seeligmüller makes a strong argument for the treatment of such cases in separate hospitals; also quoting cases in which examination by specialists contradicted the diagnosis made by young assistants, and simulation was found. He even goes so far as to state that a general hospital is a high school of simulation. Mendel sides with Seeligmüller.

Vasomotor symptoms have been observed and studied in a number of cases. H. Kriege⁶⁸ would group such cases as follows: 1. Cases of local hydrosis. 2. Cases of urticaria-like exanthems, which the author has observed to exist in two different grades: (a) as a distinct red band at the level of the skin or as a prominent protruding streak; (b) primary infiltrations of the skin, similar to those caused by some mechanical impact or thermic influence. 3. Cases of local cyanoses, such as is to be seen in Raynaud's disease. The changes of the first group can be attributed to a hyperexcitability of the vaso-dilator nervous centres. There is quite a dispute as to the mechanism of the phenomena of group 2, probably due to a partial or general paralysis of the cutaneous vessels.

Joseph Collins²⁴² contributes a case of electrical injury followed by deltoid paralysis and hysterical symptoms. The man, who was standing on a telephone-pole, repairing a break, received a current of about one thousand volts. The shock was followed by loss of consciousness and he then fell a distance of twenty-five feet, striking a cart. A short time after mental condition was clear, there being no particular evidence of shock. A later examination revealed a paresis of the deltoid and teres minor. Patient complained of numbness in entire left side and of some loss of vision in the left eye. Sense of smell and of taste was deficient on left side. Treatment by other means having failed to relieve the symptoms present, hypnotism was resorted to and a cure resulted. In this case the hysterical element was certainly pronounced, and in support of this view was the successful result by hypnotic suggestion.

Deafness from fright has been observed in a number of cases. Freund and Kayser⁶⁹ report a case of fright neurosis with anomalies of hearing. A railroad employé was inspecting the track during a thunder-storm, and a bolt of lightning struck near him on the left side; the man became rigid from fear, was confused, but did not lose consciousness. Severe trembling over the entire body appeared, and he stood holding his hands in front of his face. After returning to the depot, he complained of a crawling sensation over his entire head. There were no marks of burning on his skin or clothing. One hour later he discovered that he did not hear the bell of the engine or the noise of the cars. The tactile sensation

was abolished over the entire body ; there was concentric narrowing of the visual fields on both sides, more marked on the left than the right ; absolute loss of hearing in the left ear ; marked loss in right ; sensation of smell was arrested, sensation of taste diminished on both sides of the tongue, which was insensible to touch and to needle-pricks, as were also the cheeks and outer auditory meatus ; the corneal reflexes were wanting ; palate and pharyngeal reflexes present ; drum-heads normal on both sides. Simulation in this case was considered, but abandoned as not tenable. Treatment by faradization resulted in complete cure. Putnam¹⁷⁰ reports 3 cases of traumatic neurosis, following an electric shock received in a telephone-office during a severe thunder-and-lightning storm. At the time of the shock each operator was holding a metal plug in the hand, preparing to make connection on the key-board. No. 1 was rendered unconscious for a few moments, and on regaining consciousness complained of severe headache and of deafness of the left ear, which had been in contact with the phone. Examination revealed complete cutaneous anæsthesia of the left side of the face, pharynx, and conjunctivæ, but no motor paralysis. Recovery after treatment by suggestion. No. 2 complained of dizziness and headache. Examination in this case showed cutaneous anæsthesia of the left side of face and scalp, left side of thorax anteriorly, left arm, and conjunctivæ. The anæsthesia disappeared after two applications of the faradic brush. The headache, which had ceased, returned on resuming work, but was finally cured by hypnotism and suggestion. No. 3 had symptoms similar to the others. Sensation was restored by one application of the faradic brush.

Etiology and Pathology.—With regard to the etiology of the symptoms, many valuable papers have been written, both by foreign and American authors, upholding the theory that vascular modifications may be preliminary to later changes in the neuroglia and nervous tissues. The majority (Charcot, Oppenheim, Meynert, Seguin, and others) now place the chief cause of the disturbances following an injury, in the brain, having a psychical origin (Cerebral theory), thus opposing the doctrine of Erichsen (Spinal theory). Oppenheim holds that the fundamental cause does not consist in gross alterations, or even in such as are discoverable by the microscope, but in functional cerebral disturbances, which very probably

have their seat in the cerebral cortex, as well as the centres for motility, sensibility, and the specific senses. Nothing new has been advanced during the year in regard to the genesis of these symptoms. Dunin,¹³ also regards traumatic neuroses as of an entirely functional nature. In favor of this view he considers especially its origin after fright, without trauma, as in one of his own cases. He agrees with Charcot in that the trauma produces a condition similar to hypnosis, and that in that condition the neurosis originates through auto-suggestion. Dubois,²¹⁴ states that the only reason for assigning these neuroses a separate place in the nosography and designating them as "traumatic" is to emphasize their reality. The experience of the last year has shown that suggestion, both when patient is awake or in hypnotic sleep, is capable of provoking all sorts of motor phenomena. Dubois,²¹⁴ referring to a case of spastic paraplegia appearing suddenly after a fit of anger, explains this and similar cases on the ground of rapidly-passing inhibition phenomena in the central nervous system. The paralysis is a pathological exaggeration of the feeling of exhaustion caused by anger. Recovery is brought about by the motor impulse originating in a reflex manner.

Dubois,²¹⁴ from a study of several cases, presents the following propositions: 1. Various neuroses may originate from accidents of all kinds, and frequently in consequence of very slight traumatisms in which the psychic element is the main factor. 2. In most cases the phenomena can readily be placed under the head of hysteria (*hystéro-traumatisme* of the French). Very frequently hysteria is mixed with neurasthenic symptoms, or the latter alone present (*neurasthénie-traumatique*). Transitions to hypochondriasis, melancholia, and other psychoses, even up to progressive dementia, exist. 3. The symptomatology differs in no essential respect from that of neuroses and psychoses originating from other causes. The expression "traumatic neuroses" is only to be used to emphasize the etiology. 4. The term "hysteria" will remain. Of 20 cases examined by Hoffmann, all but 4 bore traces of nervous trouble before the traumatism; 10 cases showed undoubted signs of organic mischief; in 6 the symptoms were partially the result of exaggeration and partially of simulation; in 8 there was malingering. Hoffmann protests against the use of the term for such varied conditions, pointing out that in so-called traumatic neuroses

we may have to deal with organic nerve injury; with hysteria, the result of injury; with shock to cerebro-spinal system; with neurasthenia; or, even with a true psychosis. Freund would group the male hysteria into three categories: In the first group sensory-sensitive are exclusively involved; in the second, or middle group, motility disturbances and simultaneous sensitive and sensory anomalies. The majority of Oppenheim's cases belong to this group; third group, motility solely involved.

Brainard¹³⁹_{Mar.} refers to results obtained by Watson, of Jersey City, in 141 experiments made on dogs. Of the 141 cases 41 showed no signs of injury; in 39 there were lesions of the cerebro-spinal system; 25 were complicated by gross lesions of the spine; 14 showed uncomplicated cerebro-spinal lesions, consisting of either hyperæmia or punctate hæmorrhages. The facts elicited seem to support the theory of psychic disturbances. The pathology of this affection remains as yet somewhat obscure. Two more cases with autopsies, in one of which a microscopic examination was made, have been reported by Friedmann, of Mannheim.⁸⁴_{June} The results are of some importance as regards the relationship between the functional sequelæ and the sequelæ produced by brain-lesions. Two young adults had sustained a moderately-severe traumatism; immediately thereafter there developed localized headache, dizziness, paralysis of various cerebral nerves, and, in both cases, unilateral dilatation of the pupil. The subjective symptoms soon disappeared, but continued to recur at intervals in an extremely severe form. Some of the recurrences were attended with marked fever and even paralysis of the extremities; gradually mental disorders developed and finally death ensued in coma, after one and three years respectively. The autopsy in both cases failed to show any abnormal conditions except marked hyperæmia. On the other hand, microscopically (case 1), the small vessels of the entire brain were diffusely affected. The lumina and the vascular sheaths especially were dilated, the latter filled with round cells in large masses of blood-pigment, and hyaline degeneration of the vessel-walls was also found. Friedmann gives the following explanations: The first consequence of the trauma was a weakening of the vasomotor cells, which induced the frequent and severe hyperæmia, which must be regarded as the cause of the attacks; later, secondary degeneration of the vessel-walls, death being the

result of the hyperæmia. He explains the paralysis of the cerebral nerves as the direct effect of the concussion, no gross lesion having been found. As regards the functional neuroses, these cases agree with the observation of Sperling and Kronthal, in that the commotion tends to first attack the vascular system of the brain. The complete absence of motor symptoms in both cases tends to the view that these depend not on the vascular changes, but on some other factor, and, consequently, should be placed under a separate group of disturbances (hysteria and neurasthenia). Schultze doubts that the lesions found could be the only cause of death, and questions the possibility of poisoning.

Prognosis and Treatment.—There still remains a great difference of opinion between writers as to the prognosis of traumatic neuroses. As regards life, it is good; but as to future health, unpromising. Oppenheim believes that complete recovery should be held as rare. Even in those cases reported as cured we frequently find a certain weakness, great irritability, and change of character. No trustworthy data are given on this point in the literature of the year.

Regarding treatment, nothing new has been mentioned. The necessity and importance of treating this class of cases by isolation, away from the influence of friends and relatives, is now more generally recognized. The patient should be absolutely under control of the physician and with a competent nurse in charge,—one who understands the management of such cases. Indications for medical treatment depend on each individual case. Experience still teaches us that narcotics should be avoided. In Hun's 2 cases,¹ improvement did not take place until after seclusion in a hospital, combined with vigorous and painful treatment. The first patient was cured, and the second greatly improved. Electricity, hypnotism and suggestion seem to have been the most successful in the cases reported. The faradic brush, using a very strong current, was used in Freund's case.⁶⁹ After four *séances* sensation to pain re-appeared over the entire body, and a general improvement took place. The anomalies of taste and smell were removed by intra-buccal faradization. Putnam's 3 cases¹⁷⁰ were cured by the combined use of hypnotism and faradization.

Medico-Legal Aspects.—In January, 1891, before the Berlin

Society of Psychiatry and Nervous Diseases, Oppenheim⁶⁸ dealt especially with the subject of malingering. In 67 out of 68 cases, his diagnosis was verified by the subsequent history of the person (*vide* "Semeiology and Diagnosis").

Among 24 cases, J. Hoffmann found 8 of simulation, and is of the opinion that the characteristic picture of traumatic neurosis may be accurately and successfully simulated. Hoffmann proved one case a simulator, who had narrowing of the fields of vision, tremor, and color-blindness.

Dubois,²¹⁴_{Sept. 15} in citing Hoffmann's cases of simulation, in which two confessed, states that, even if a confession is obtained, it means nothing, since hystero-neuroses are to be regarded as psychoses, and such confessions can be obtained in cases of undoubted hysteria. He acknowledges that simulation occurs, but regards such cases as rare. Dubois advises that such patients be referred to proper hospitals, the cost to be defrayed by the employer. The sojourn in such institutions should be made obligatory upon those who desire compensation until a cure has been accomplished or question of cure decided. If the treatment by experts is not successful and it has been decided incurable, and a long-lasting invalidism has been shown, then the compensation should be awarded as soon as possible in the form of a pension sufficient to maintain life, which is to be reduced or withdrawn in case of improvement or cure.

Dercum,¹_{June 6} referring to the disappearance of so-called litigation symptoms, when a claim for damages has been settled, states that, in his experience, the mental condition improved very much.

In Hun's 2 cases of traumatic hysteria,²_{Feb. 7} heavy damages were awarded. In the first case, the cure did not take place until more than a year after the damages had been awarded; in the second case, great improvement was obtained three years before. In both cases the question of simulation was carefully considered and was excluded.

Moebius⁸⁴_{Sept. 29} attacks Seeligmüller in the 2 cases of simulation so recorded, as in the first case he gave no report of the examination of sensation, and it was therefore not reliable. He believes that this was a case of traumatic hysteria. In the second case the same argument applied. Regarding the frequency of simulation, the following data are given: Schultze, 33 per cent.; Hoffmann, 33 per cent.; Seeligmüller, 25 per cent.; Rumpf and

Mendel, a large number, though smaller than Hoffmann ; Oppenheim, 4 per cent. ; Rumpf, Benedict, and Moebius, no decided data ; Bruns, 40 cases, 3 of simulation.

SURGICAL DRESSINGS AND ANTISEPTICS.

By JOHN H. PACKARD, A.M., M.D.,

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J. William White²⁰⁸¹ reviewed the present position of antiseptic surgery in a paper written with the view to reply to Lawson Tait's criticism of Sir Joseph Lister's address at the last International Congress. He concludes with a vigorous protest against its tone, and against the personal virulence of its references to the originator of the antiseptic system. Tait's astounding statements he ascribes to ignorance of general surgery and to a highly specialized experience; the peritoneum, with which Tait usually deals, possessing remarkable powers of self-protection. Comparing Tait's results with those of Thornton, however, who recently acknowledged a mortality of 1.88 per cent. under strict antiseptic measures in ovariectomy as against Tait's 33 per cent., even this excuse is invalidated. As to the use of the double cyanide of mercury and zinc which Lister is now using, and which Tait takes advantage of to accuse the entire system of "perpetual shifting," White presents a remarkable list of 197 surgical cases treated since beginning the use of the double cyanide gauze, and very properly considers this new feature in the system as another striking example of Lister's remarkable willingness to receive and profit by all new discoveries and all genuine advances bearing upon the antiseptic theory.

In a clinical lecture on surgical details recently delivered by Tait,⁶ he reiterates his views characterizing the antiseptic method as a "strange phase of eccentricity." "The harm that he does," says Geo. E. Shoemaker,⁹ "is not great among men who, especially in general surgery, are doing the best work. These cannot work for a day without discovering for themselves that their results are better or worse according to their microscopical and chemical cleanliness in operating. But the harm Tait can do is in unsettling the mind of the man who is beginning his work; and, worse than that, his writings tend to salve the consciences

of those who have had no training in genuine aseptic methods, who fail consequently to carry them out, and who joyfully hail any champion who even seems to justify their indifference."

The lecture in question gave rise to an interesting controversy, in which R. O. Adamson,⁶_{Oct. 3} H. Sewill,⁶_{Oct. 10, 24} H. Taylor,⁶_{Oct. 31} and E. Wearne Clarke⁶_{Oct. 31} took part, Lawson Tait replying to the arguments advanced.⁶_{Oct. 3, 24, 31} White closes up his article by saying: "There are many problems relating to the principles involved which are yet unsolved; the precise comparative value of the different factors which, taken together, have given modern surgery its scientific exactness is yet to be determined; argument and discussion are not only excusable but highly desirable, and, conducted in a proper spirit, could scarcely fail to be productive of great benefit to surgery and humanity. But this is not to be brought about by invective or by personal detraction." It is to be hoped that Tait will soon realize the force of this, and assume a position more in accord with his eminence.

The conditions underlying the infection of wounds, including a consideration of disinfection with reference to treatment, were discussed by W. H. Welch, of Baltimore, and Roswell Park, of Buffalo, at the Congress of American Physicians and Surgeons. Welch¹_{Sept. 26} considered the presence of certain kinds of bacteria an essential of wound-infection, and the practical result of the application of the doctrine to the management of wounds as the most eloquent testimony to its life-saving truth. Observations as to the relative frequency of the occurrence of the ordinary pyogenic staphylococcus and streptococcus were not altogether in accord. The majority of investigators had found the staphylococcus pyogenes aureus the most common cause of suppuration. Other observers had found that the staphylococcus pyogenes albus was by far the most frequently present in all kinds of suppuration, as in abscess, cellulitis, lymphangitis, osteomyelitis, etc. The staphylococcus pyogenes albus was generally described as not differing essentially from the yellow. The most important differences were greater slowness in the liquefaction of gelatin and in the coagulation of milk. There existed a great difference in the powers of the various pyogenic cultures. Again, it had been demonstrated that large numbers of such cocci might be inoculated into the living healthy tissues without evident effect. No doubt the result was greatly

influenced if these pyogenic germs entered tissues already charged with poisonous material. Sometimes a very small number of cocci would produce marked effects, if accompanied by other toxic substances, and the result would bear relation to the intensity of these substances. In practice we often had to do with impure cultures with which were mixed all kinds of pus-producing elements, and, therefore, the material might exert a degree of virulence that laboratory cultures did not possess. The skin might have all sorts of bacteria on its surface, but in addition it had its own distinct bacteria. The prevailing organism was the *staphylococcus albus*. It would be found at a deeper level than could be reached by any known process of skin-disinfection. These cocci were frequently found in skin-stitches, and were present without causing inflammation. They, however, no doubt played an important part in the stitch-abscess. There was no reason to doubt that the pyogenic cocci were special agents of infection, but the effects which they produced depended upon the variety of conditions in the soil in which they found place, and upon the toxins with which they were accompanied.

Park presented the following conclusions : 1. Study of wound infection and of the septic condition thereby produced is inseparable from a study of what constitutes immunity. 2. By a study of immunity is furnished the best clue to a due appreciation of the principles of asepsis. 3. The surgery of the future must aim to be aseptic, for, so far as fresh cases are concerned, we have passed the merely antiseptic era. 4. Asepsis is to be achieved not alone by attention to the wound and the paraphernalia of operation, but by the closest regard to the condition of the patient's organs and tissues. 5. Sepsis may arise from circumstances and conditions other than those pertaining to the wound itself, although hitherto practitioners have been too prone to scan solely this field when searching for its cause. 6. Sepsis and infection are combated in more than one way by natural agencies and by inherent properties of cells and fluids totally aside from the measures which the surgeon institutes, and the wisest man is he who studies to take advantage of these vital activities rather than to introduce new and conflicting elements from without. 7. A recognition of the power of chemotaxis, possessed by organized and unorganized materials in such varying degree, can be utilized to great advantage so soon as it can

be reasonably and clearly defined. 8. A study of chemotactic activity appears to impress one with the truth of the phagocyte doctrine, which, if proved, is one having a large bearing upon the principles as well as the practice of the surgery of the future. 9. The proteid material contained within cellular infectious organisms both plays such a rôle in causing chemotaxis, as well as in poisoning the animal infected, that we have reason to eagerly welcome all knowledge concerning it. 10. So fast as such proteid material can be isolated, we need, among other things, to study its effect upon the commonly used antiseptic agents. 11. We need to study much further the antitoxic and bactericidal properties of human blood-serum, and the means by which we can avail ourselves of the same. 12. Some such classification as he had attempted to give of the various causes of lowered resistance to infection, or of the causes of vulnerability or susceptibility, will certainly assist in a due appreciation thereof, and will often aid in so fortifying the patient that he may resist infection to which he would otherwise succumb. 13. The condition of enterosepsis, fæcal toxæmia, stercoral intoxication, or whatever it may be called, is certainly one which every practitioner has to fear, and against which he should assiduously guard. It is not generally enough recognized and combated. 14. A sub-form of this condition might justly be made and entitled gastrosepsis, comprising cases where defective stomachic digestion, often from dilatation, brings about a lithæmic or other toxæmic condition, which favors infection. 15. Antiseptic agents in the past have worked a revolution in surgical practice and results. We have now reached a time when we know that they all have their disadvantages, and also understand how, if we are strictly antiseptic in our work, we can afford to discontinue their application to wound surfaces. 16. But the insurance of aseptic character of such work necessitates the use of antiseptic agents of some kind upon everything which may directly or indirectly come in contact with these surfaces. 17. When this work is strictly aseptically performed, the use of drains or further employment of antiseptics is either an expression of mental uncertainty or of fear. It may be in the interest of humanity, undoubtedly it often is, but it is not attaining the ideal of scientific work.

Behring⁶ described the results of his experiments with chemical preparations on living tissue as regards their disinfecting

capability. He succeeded in curing animals affected with anthrax with a mixture of solution of sublimate and sodium chloride. The mixture possesses an antiseptic action ten times stronger than either solution used alone, although its action as a poison does not increase in the same degree. He had performed experiments to show the therapeutic action of the blood of immune animals on anthrax, and he had come to the conclusion that blood had a disinfectant action in other diseases.

A strong plea in favor of antiseptics is presented by Robert T. Morris, of New York,¹⁸⁸_{Sept.} who publishes his third series of 100 consecutive operations showing the results of antiseptic methods of work. J. Collins Warren⁹⁹_{Oct. 3} contributes the aseptic and antiseptic details observed during operations in the Massachusetts General, the Boston City, and the Children's Hospital, where the excellent work done produces most satisfactory results. A. G. Gerster⁹⁹_{Oct. 3} considers that personal cleanliness and cleansing of the field of operation are to be accomplished by mechanical measures rather than by disinfectants. In perfectly aseptic operations no drainage is required.

Armand Ruffer⁶_{Aug. 23} states that leucocytes and wandering cells, in general, have the function of removing foreign bodies (blood-clots, ligatures, micro-organisms, etc.) which have been accidentally left in a wound, or purposely introduced into it. Any agents, therefore, which to any appreciable extent prevent the emigration of wandering cells must retard the healing of a wound. The object of his experiments was to find out what effect, if any, antiseptics produced on the emigration of leucocytes. He found all antiseptics, as used in surgery at the present moment, when applied to a wound, hindered the emigration of leucocytes to the spot where the antiseptic is placed. This inhibitory action varies with the kinds of antiseptics used, and the action is purely local. It is not a paralyzing action, for when an antiseptic is placed under the skin the leucocytes emigrate, but shun the antiseptic. A substance may have very low antiseptic properties and repel leucocytes most energetically,—as lactic acid,—or it may possess fair antiseptic powers and not repel leucocytes, like iodoform; or, being a strong antiseptic, may either attract or repel,—such as carbolic acid and sublimate. Generally speaking, the chemical substances which combine readily with the salts and albuminoid bodies of the blood—

e.g., carbolic acid and sublimate—do not repel leucocytes so energetically or for so long as those which do not readily combine, *e.g.*, aniline, benzol, etc. Nevertheless, this is not due to a possible mechanical action of such substances, as can be easily proved by actual experiment.

M. Baudouin, of Paris, ¹⁰⁰_{Aug. 20} wrote an elaborate article on “Asepsis in Surgery,” in which he reviewed the field in its present state, and the best means and apparatus for the proper carrying out of every feature of asepsis. He says that with complete asepsis pus and febrile symptoms will never be met with, while the intoxication phenomena occurring in the course of the antiseptic system will, of course, never be observed. Unless a complete asepsis in the mechanical procedures of the operation can be carried out, the antiseptic system had better be resorted to. Kuester, of Berlin, ¹⁹_{Sept. 12} states that, theoretically at least, there can be no doubt but that the practice of antiseptics should yield to that of asepsis. He adduces 2 cases of fatal bichloride-of-mercury poisoning in a list of 60 operations.

H. O. Marcy, of Boston, ⁶¹_{July 18} thinks that the ideal treatment of wounds is certainly the restoration of the condition of the parts operated upon to, as nearly as possible, their primal state. If this can be effected aseptically, then there are no bacteria to be removed; and if the wound is surgically clean, with accurate coaptation of the sundered parts, then the vital forces are sufficient to utilize any resultant exudates, and drainage is not alone superfluous, but harmful. The reparative process should go on under a dressing which will permit of the introduction of no foreign factorage. The various antiseptic dressings now so generally used have a value in wounds necessarily drained; that is, subject to a probable infection; but in aseptic wounds primarily closed they are unnecessary, expensive, and cumbersome. Rev. Dr. Kroonenberghs, who has lived fifteen years among the Zulus, in a letter to the ANNUAL some years ago, stated facts which demonstrate that this procedure has been carried out by these savages from time immemorial to the present day.

A lively discussion on antiseptics took place at the annual meeting of the National Association of Railway Surgeons, following a paper on these subjects by Klingenschmidt, ²⁶⁹_{May} in which the progress following antiseptic means in the results of operations

was ably outlined. U. C. Lynde, of Buffalo, having expressed the opinion that it is beyond the power of surgeons to practice aseptic surgery to the letter, and that as far as antiseptic surgery was concerned the organisms cannot be destroyed without "killing" the living tissues, W. P. King, of Kansas City; S. Birdsall, of Susquehanna, Pa.; R. Harvey Reed, of Mansfield, Ohio; S. C. Benedict, of Athens, Ga.; J. H. Murphy, of St. Paul, Minn.; and S. S. Thorn, of Toledo, Ohio, illustrated by a large number of severe cases the remarkable results obtained under antiseptic methods as compared to those of pre-antiseptic times. F. S. White¹⁴³_{July} and W. R. Ballou¹_{July 28} have published articles to the same effect.

Microcidine is a new antiseptic recommended by Berlioz,¹²⁸_{Oct.} made by adding to β -naphthol brought to the temperature of fusion one-half of its weight of caustic soda. When cold this turns into a white powder, which is soluble in three times its weight of water. It possesses ten times the antiseptic powers of carbolic acid, but is inferior to bichloride of mercury. Its value lies in being inoffensive, though quite potent as an antiseptic.

SURGICAL DRESSINGS.

Howard A. Kelly²⁷_{Dec.} would consider as an ideal dressing one which would quickly harden, forming a flexible and impenetrable layer, possessing in addition the property of being transparent, to enable the wound to remain under constant observation. Although unable to secure a transparent dressing unaffected by cotton or other protective in contact with it, he found, and for two years has used, a dressing which hermetically seals the wound in a thin layer, with certainty preventing the invasion of pathogenic organisms from without. This dressing is easily made, simple, and always satisfactory. After closure of the incision, the skin, the line of the wound, and the sutures are dried, and two layers of sterilized gauze or cheese-cloth, large enough to project five to ten centimetres (two to four inches) beyond the incision on all sides, laid on the skin. This is saturated with the following adhesive mixture, which is evenly distributed over the whole surface:—

R Squibb's ether, or washed ether, and alcohol (absolute), equal parts.

Bichloride of mercury (Merck's recryst.), enough to make the solution $\frac{1}{1000}$.

Snowy cotton (Anthony's), enough to make a syrupy consistence, added in small pieces, stirring.

As soon as this is poured over the wound evaporation begins to take place at once, and the celluloidin hardens, gumming the gauze fast to the skin. To avoid delay in waiting for this to grow quite hard, and to prevent adhesion to the cotton applied above it, the whole surface is freely dusted over with a finely powdered mixture of iodoform and boric acid:—

R Pulvis iodoformi, 4 grammes (1 drachm).
 Acidi borici, 28 grammes (7 drachms).
 M. Exactissime. Sig.: Dust freely on wound.

This powder is of itself an invaluable protective. He uses it constantly in obstetric cases, separating the labia and throwing it into the vagina, where it acts as a guard to the vaginal outlet against septic invasion from without. The wound, thus sealed with celluloidin gauze, may be left untouched for a week or more, when the dressing should be softened with water, or more rapidly with ether, the gauze lifted off, and the stitches taken out. If there are any signs of suppuration, as evinced by pain, local tenderness, and redness, associated with elevated temperature, the dressing should be removed earlier and the discharge of the stitch-hole abscess promoted in the usual way.

Kaori Resin.—The resin of kaori, belonging to the coniferæ (*Dammara Australis*), and growing in New Caledonia, is strongly recommended by Le Gall²⁰⁵⁴ as a dressing for wounds and ulcers. After antiseptic cleansing and thorough drying of the surface, the application of an alcoholic preparation of the resin, by means of a camel-hair pencil, forms a thin, impermeable layer, under which cicatrization takes place rapidly.

Zinc Sulphite.—Tichborne, of Dublin,⁷⁴⁴ highly recommends zinc sulphite as a material for antiseptic dressings, as being non-poisonous, non-irritative, and highly antiseptic. It is best prepared by mixing in solution 6 parts of zinc sulphate and 5½ parts of sodium sulphite. The reaction takes place slowly, but goes on to completion, the new salt formed being very insoluble in water, but soluble in excess of sulphurous acid. Zinc sulphite can be used for the saturation of any fabric, such as gauze or lint, without the intervention of an adhesive material. The fabric is first boiled with water, to cleanse and sterilize it, after which a boiling solution of zinc sulphate and sodium sulphite is poured on it, and the whole allowed to stand for twelve hours. It is desirable to add

to this kind of dressing some organic pigment which will distinguish it from others, and serve also the purpose of indicating the progress of the discharges by the action of liberated sulphurous acid on the color.

Aristol.—W. C. Wile, ⁶¹_{Aug. 9} strongly recommends aristol, owing to its freedom from toxic effects and its inodorousness as compared to iodoform, all the qualities of which for local use it possesses. Lysol is recommended by Leo Szuman. ⁵²⁰_{No. 4}

Dermatol.—Sackur ⁴_{Aug. 10} publishes the results of experiments with dermatol as a substitute for iodoform. While resembling the latter in character and color, dermatol is free from odor and poisonous properties, and it has been used in Breslau as an application to wounds in a hundred cases with, on the whole, satisfactory results. When applied to fresh, clean wounds it promoted rapid cicatrization, and, owing to its absorbent character, kept the wound dry and the skin free from the eczema that is so often produced by irritating discharges. Dermatol is less suited to septic wounds,—for example, abscesses or carbuncles. With such the better plan is first to cleanse the wound by antiseptic treatment, and then to resort to dermatol as a healing application. In the treatment of chronic ulcers Sackur met with highly satisfactory results, except where such ulcers had an indolent character and were covered with dry, chronic granulations. Here dermatol proved insufficiently stimulating. As regards antiseptic and antituberculous action iodoform is superior.

Sublimate Baths.—Mansell-Moullin ²_{Oct. 24} described before the Medical Society of London a method of dealing with lacerated wounds, especially those in which fracture was complicated by extensive lacerations. It consisted in placing the wounded part in an antiseptic bath at the temperature of the body. He had tried this procedure in 30 cases with only 2 failures, and these 2 were in all probability directly due to the escape of sewer-gas in the immediate vicinity of the patients. He began with a 1 in 1000 sublimate solution, reducing the strength in a day or two to 1 in 10,000. As to duration, sometimes the bath was employed only for an hour; in others it had been kept up for a fortnight, night and day. In the 2 patients who had remained under the treatment for a fortnight there were unmistakable symptoms of mercurial poisoning, but they ceased immediately on the bath

being suspended. As a general rule, no symptoms pointing to mercurial absorption were present.

Chlorophenol.—Tacchini has obtained a preparation which he terms chlorophenol, and which is quite as antiseptic as the trichlorophenol, but free from the disadvantages of the latter. It is stated to have no unpleasant odor, to be non-irritating and highly volatile; its vapor is heavier than air. Passerini⁵⁷ first satisfied himself of its activity as a local application to wounds, sluggish ulcers, and suppurating lymphatic glands, and then employed it in several cases of ozaena, laryngitis, chronic bronchial catarrh, and especially in cases of pulmonary tuberculosis,—in all with marked success.

HAND DISINFECTION.

H. A. Kelly,⁸⁰ reaches the following conclusions as to the best method to be employed for hand disinfection: 1. Scrubbing the hands, with especial attention to the nails,—not more than one millimetre in length,—for ten minutes in water, frequently changed, at about 40° C. (104° F.). 2. Immersion of the hands in a solution of permanganate of potassium, made by adding an excess of the salt to boiling distilled water, until every part of the hands and lower forearms is stained a deep mahogany-red or almost black color. They are then transferred at once to a saturated solution of oxalic acid, until completely decolorized and of a healthy, pink color. This decolorization is accompanied by a sense of warmth, due to chemical reaction, and a sharp stinging wherever there is any abrasion of the epidermis. 3. Washing off the oxalic acid in warm, sterilized water.

By this simple process the hands are rendered more nearly absolutely aseptic than by any other known means. In 50 experiments, after disinfection by this method, 44 remained without growth; the remaining 6 yielded, respectively, eighty, twenty, ten, nine, five, four colonies,—an enormous quantitative difference in favor of permanganate of potassium and oxalic acid as contrasted with soap and water and corrosive sublimate.

Charles P. Noble, of Philadelphia,¹⁹ recommends peroxide of hydrogen in addition. The method which he employs for rendering the hands aseptic is as follows: The nails are trimmed reasonably short, and the subungual spaces are cleared with the knife-blade. The hands and forearms are then thoroughly washed in

warm water, a good lather being made with soap, and a stiff nail-brush being vigorously applied. The water is renewed three times. The hands are next soaked in a saturated solution of permanganate of potassium, and this removed by soaking them in a saturated solution of oxalic acid. According to circumstances, the fingertips are next soaked in peroxide of hydrogen; for the final bath corrosive-sublimate solution (1 to 1000) is employed. The hands remain in the sublimate solution three minutes. At least ten and often fifteen minutes are consumed in the cleansing process.

Straw-Ashes.—Kikuchi²⁰⁰_{Sept. 26} recommends the straw-ashes obtained by burning rice-straw as a surgical dressing, on the grounds that they have strong absorbing properties, are soft and elastic, cheap, and easily obtainable. The material which he used was an old straw bag, made into a coarse powder, after burning, by rubbing the ashes between the palms. From 50 to 100 grammes (1½ to 3 ounces) are put in a cushion of gauze, which is applied over a piece of iodoform gauze. This dressing is said to be especially advantageous in military service.

Paraffo-stearin, a material used for making candles, is highly recommended by Hospital-Steward Graham⁹⁹_{Dec. 18, '90} as a substitute for starch or plaster of Paris for solidifying dressings. Heated to about 160° F. (71.1° C.), it becomes liquid, and felt or bandages may be soaked in it, to be applied while still warm to the affected part; for further strength and solidity, more of the melted paraffo-stearin may be smeared on with a brush. It may readily be softened for removal by means of benzin. The cheapness, lightness, and instant solidification by cold water of this material would seem to be substantial points in its favor.

Crude Opium.—The use of crude opium as a surgical dressing is highly spoken of by Luscher.⁷²_{Jan.} He first saw it employed in the treatment of gunshot wounds in the Chinese army. It is simply spread upon cloth, and readily adheres when applied to ulcers or other wounds. As soon as the onset of drowsiness indicates its absorption into the system it is removed, and some other dressing, such as aristol, substituted.

Spanish Moss.—Tiffany⁹_{Dec. 18, '90} advocates the use of Spanish moss (*Tillandsia usneoides*) for the making of compresses or cushions, by means of which, applied outside of dressings, raw surfaces may be held in contact and "dead spaces" prevented. He says

it is very light, elastic, and easily sterilized, and that his experience attests its value.

Modified Gamgee Tissue.—E. Wearne Clarke,² showed to the Sheffield Medico-Chirurgical Society a new surgical dressing, and pointed out that it differed from the familiar “Gamgee tissue” in consisting of two layers,—one of absorbent wool, placed next the wound, and one of non-absorbent wool, externally. The outer layer was specially prepared, so as to resist the passage of fluids. The dressing was charged with sublimate throughout. The air passing through the porous wool was filtered of the micro-organisms it contained. The dressing was light and inexpensive, and was at once absorbent, water-proof, and aseptic.

BANDAGES.

Goldthwait⁹⁹ gives some practical points as to plaster-of-Paris bandages. He points out that the delay in hardening or “setting” of the plaster is often caused by the fact that the crinoline used has been sized with glue instead of starch; hence, he advises that in all cases the sizing should be soaked out from the bandages (after they have been torn). When applied, the plaster should be thoroughly rubbed into the bandages. No salt should be used in the water in which the bandages are immersed before being put on. For removal it is best to score the bandage with a knife, and then to run a few drops of water into the groove thus made; next to score along the groove deeper, and apply a little more water, when the stuff will be so softened that it can be easily cut through by passing along it a knife with a concave edge, cutting outward or away from the skin. Geo. T. Elliott, of New York,¹ writes a review of some of the cutaneous eruptions appearing under plaster-of-Paris dressings. The employment of silicate of soda in solution as a substitute for plaster of Paris in the making of solidifying dressings is earnestly advocated by Baxter.⁸¹

SPONGES, ETC.

Sponges, although laid aside at present by very many surgeons, have some advantages not possessed by any substitute hitherto proposed. In an article by Maylard⁹⁶ the method of their preparation is described, and the means by which they may be sterilized. Dense or close-textured sponges are more apt to resist the

latter process than those which are looser and more porous. Exposure to boiling or very hot water (above 90° F.—32.2° C.) alters the structure of a sponge, causing it to shrink and turn brownish, and to harden on drying. Wherever procured, sponges consist of a fibrous frame-work of “keratode,” coated in the living state with a gelatinous protoplasm called “sarcode.” This latter must be removed by squeezing and beating; then the frame-work is dried and bleached, and a yellow color given it by soaking in a mixture of lime and sea-water, when it is ready for the market. Any retained sarcode will give trouble when moisture and heat are applied to the sponge. The American trade is supplied chiefly from Florida and the West Indies. The dried sponges are treated with dilute hydrochloric acid and with solution of potassium permanganate. Now, to render sponges sterile, and therefore harmless for surgical use, it is found by experiment that a solution of carbolic acid (1 to 40), even long continued, is inefficient; but a 1-to-2000 solution of mercuric bichloride attained the object. Maylard thinks the small, cup-shaped Turkey sponges preferable. Kept in a 1-to-500 solution of mercuric bichloride for a long time they become darkened; they may be bleached again by brief soaking in a 1-to-64 solution of potassium permanganate, and then in a like solution of oxalic acid. No sponge which has been employed in any distinctly septic case should ever be again used for a surgical purpose. John B. Roberts⁹ recommends Egyptian loofah for scrubbing the skin before operations. It may be found in all drug-stores, and a small piece once used can be thrown away. It is compressible, and can easily be carried in operating-cases.

LIGATURES.

Choice of Ligatures.—At a meeting of the Société de Chirurgie, Bouilly³ _{July 16}, ²² _{July 22} said that he preferred the silk ligature to the catgut, the latter being difficult to render aseptic, and often of bad quality. Kocher had often experienced much trouble from inferior catgut. For strong ligatures he used plaited silk; being flat, the knot does not slip as in the round ligature, which he reserves for tying vessels, etc. For a long time he used to boil his silks in a strong solution of phenic acid, but he observed more than once a slight local suppuration of the pedicle in cases of laparotomy, and now he subjects them to heat at high

pressure, and plunges them into a 1-to-1000 solution of sublimate. Pozzi thought that catgut was superior to silk in a certain number of cases, such as ligatures and deep sutures; it is readily absorbed, and consequently does not act as a foreign body. When an organ is to be fixed, however, silk is preferable, as catgut disappears too quickly. In operations on the deep cavities and the mucous membranes silver wire should be substituted, except in amputation of the neck of the uterus, where good strong catgut is better. Terrier said that good catgut was difficult to obtain; the tendon of the kangaroo seemed to him to be the best. Therefore, he invariably used silk, except in suture of the neck of the uterus.

H. O. Marcy, of Boston, ⁶¹_{Dec. 1} recommends kangaroo-tendon, and ventures to predict that at an early date the clumsy method of closing wounds with interrupted sutures will be relegated to history, and the tendon suture become an indisputable factor.

Catgut Infection.—P. Klemm ²²⁶_{B. 41, R. 4} has noticed about the eighth or tenth day an increase in the temperature, with redness and swelling in the vicinity of the wound. Examination revealed pus in its interior. This was not in the track of the superficial silk sutures, but of the deep catgut (terrace) ones. Cultures with similar catgut demonstrated its freedom from germs. Careful consideration of the subject led to the conclusion that catgut, like a moist blood-clot, acts as a very favorable nidus for the growth of suppurative germs. The infection undoubtedly came from without at the time of the operation. As silk does not afford the same favorable nidus as does catgut, there is more probability of a wound remaining sterile when the former is used than when the latter. This was demonstrated in a series of experiments, here detailed, in which two wounds were made under the same conditions in the same animal. In one aseptic silk was placed, and in the other aseptic catgut; the former pursued the more favorable course. The author concludes that, while catgut can be sterilized, its use is not to be encouraged in surgery, on account of the aid it gives to the development of suppuration in wounds not absolutely aseptic.

A new aseptic suture-cylinder is described and figured by Slee. ¹⁵⁷_{Jan.} The silk or other material is wound on a glass reel, and boiled for one hour in a bath consisting of 1 part each by weight of carbolic and salicylic acids to 32 parts of yellow bees' wax, thoroughly mixed by boiling. It is then cooled in a sterilized

bottle, and then sealed off in the cylinders, which have at one side an aperture, closed by a rubber cork cemented in, the silk passing through a fine hole in the centre of the rubber cork. The sealed cylinder is subjected to steam sterilization for one hour, and again the next day, when it is ready for use. This apparatus is said to have withstood the severest tests.

INSTRUMENTS.

Referring to F. W. Langdon's paper⁵³_{Feb.7} on the use of ordinary commercial benzin as an antiseptic agent, Lavrentieff, of Tzaritzyn,²_{Aug.8} states that for many years he has employed the fluid for disinfecting his surgical instruments, simply keeping them immersed in it. While securing an aseptic condition, benzin does not corrode instruments, and generally does not injure them in any way. The only drawback attending its use is said to consist in its extreme volatility. Lavrentieff recently tried to substitute for benzin another common product of petroleum, namely, kerosene. Up to the present he is satisfied with the results. The substance does not corrode instruments, while it is less volatile and much cheaper than benzin.

For preventing needles from rusting Dawbarn¹_{June 20} advises that they be kept in alcohol. He cleanses them from grease by washing with benzin; this is wiped off, a bit of cork applied to each point, and they are then put and kept in a wide-mouthed glass-stoppered bottle filled with absolute alcohol.

Sterilizing Apparatus. — Instrument descriptions, as usual, have formed a good part of the literature of the year, apparatuses for sterilizing instruments taking a prominent part. Kaschkaroff, of Jaroslaw, Russia³³⁶_{Mar.28}; Kahnemann, of Berlin⁷⁴⁸_{Oct.}; and Egbert Braatz, of Heidelberg,⁶⁹_{Sept.17} each submit ponderous-looking sterilizers. Cushing, of Boston,⁹⁹_{Feb.12} describes a stove-like apparatus for sterilizing surgical instruments which he had seen in Berlin. The heat-bed is represented by the oven, the steam reaching through a perforated plate below. The articles can be kept at a temperature of about 214° F. (101° C.), thus insuring perfect sterilization in half an hour.

Steam is now almost universally used for sterilizing dressings. In using a steam-sterilizing apparatus, it is better to have the steam enter at the top and escape below; it is quicker and much more

efficacious. Lautenschläger's apparatus is used by von Bergmann. This is composed of an outer asbestos jacket and two inner copper cylinders, between which the water is held. When the lid is on, the steam ascends between the two inner cylinders, and passes inside to the dressings from openings in the top; it escapes from an opening near the bottom. Heat is applied by a gas-jet beneath the apparatus, and it goes up along the sides, between the outer copper cylinder and the asbestos jacket, to escape by holes at the top. The dressing is allowed to remain three-quarters of an hour, subjected to a heat of 100° C. (212° F.). In order to avoid handling and exposure, the dressings are placed in tin kettles or boxes, having openings at the top and bottom, which can be closed by means of a slide. The openings are left uncovered, and the apparatus and dressings placed in the sterilizer. When sterilized, the slides are shut and the box taken to the operating clinic for use.

Needles and Needle-Holders.—For the purpose of easily placing the interrupted suture, G. W. Crile, of Cleveland,²²² devised the instrument shown in the cut.

CRILE'S NEEDLE-HOLDER.
(*Cleveland Medical Gazette.*)

The handle is formed of hollow, hard rubber, containing two adjustable spools, around which the suture may be wound. The handle, by forming support for the hand-muscles, avoids fatigue, and the suture, being drawn directly from its cavity, which contains an antiseptic fluid, renders infection impossible. Williams of Baltimore,⁷⁸¹ devised an ingenious needle-holder,—a modification of Zweifel's,—which presents the advantage over the latter of being readily separable, instead of permanently united, as is the latter. It can be used for all kinds of needles, including Hagedorn's. An instrument devised for the same purpose was contributed by J. P. Warbasse, of Brooklyn,¹; a modification of ordinary forceps, to enable them to hold the needle properly, was described by Skene. F. B. Jessett, of London,⁶ to rectify the tendency of the needle to slip when Hagedorn's holder is used, suggested that a spur

be added to the end of the sliding-bar, this spur to fit into a notch on the opposite surface when pushed home. An instrument made with this improvement fulfilled the desired object. Elliott, of Savannah,¹ does away with all handles by modifying Hagedorn's needle. The eye is made round for the use of catgut. The shaft is rounded on the sides and flattened slightly on the other faces, which gives the operator a firmer hold. The curved cutting portion has its edges placed antero-posteriorly instead of laterally, as in the ordinary needle. The convex edge only was made to cut, to avoid too long a slot. The cutting part is longer than that of Hagedorn's, and therefore sharper, and enters more easily.

Catgut-Holders.—Gut-holders are submitted by M. M. Bowlan, of Newcastle-on-Tyne,⁶ and Vömel.⁷⁴⁸ The former consists of a deep, nickel-plated box, with an oil-tight lid and a light, fenestrated frame-work supporting three separate reels, which revolve on a fixed axle, the reels being so placed as to be easily removed for recharging. The box being hermetically closed, can be conveniently carried about. Vömel's instrument resembles a test-tube, closed with a screw-lid. A cork stopper gives passage to the end of the catgut, which, previously rolled tightly around a pencil and then slipped off into the oil of the bottle, presents in the bottle the appearance of a close spring coil. The catgut is thus exposed on all sides to the oil.

Hypodermatic Syringes.—An aseptic hypodermatic syringe is introduced by J. J. Thomas, of Youngstown, Ohio,¹⁹ in which



THOMAS'S ASEPTIC HYPODERMATIC SYRINGE.
(*Medical and Surgical Reporter.*)

the needle is connected directly with the bulb without the intervention of a glass cylinder (see cut). The bulb is pressed flat and the needle is inserted into some water. On releasing the bulb, the latter fills with water in five seconds or less. The water is discharged into a teaspoon, a solution is made of the tablet or

powder, and the bulb is again drawn full, this time with the fluid ready for injection. Another aseptic syringe was devised by Reinhardt, of Heidelberg, ³⁴_{Oct. 27}, in which the new feature is the fact that the piston can be liberated from its rod, the latter being screwed; the instrument, like Thomas's, can thus easily be taken apart and asepticized.

A new acupressure pin is described by W. J. Branch, of St. Kitts, West Indies, ²_{Sept. 19}, which embodies the sheath of the ordinary trocar. The pin fits into a silver cannula, from which it can be withdrawn immediately after its introduction, leaving the cannula alone *in situ* and in control of the vessel. In this way the irritation produced by the presence in a wound of a sharp-pointed instrument and also of a steel wire, with its liability to rust, is avoided. These are definite advantages, especially in the climate of the West Indies, where steel rusts so quickly and where tetanus is so easily induced.

Aseptic Knives.—J. Johnston, of New York, ¹_{Feb. 7}, designed an improvement in securing blade to handle in detachable pocket-case knives. The instrument is metallic throughout, and its simplicity of construction makes it so easy to clean that it is entitled to considerable praise.

Sponge-Holders—Eliza M. Mosher, of Brooklyn, ¹⁵⁷_{June} contributes a "harpoon sponge-holder." It consists of a stiff, metallic stem, terminated by a sharp-pointed hook. It has upon it a sliding tube, and is surmounted by a metal handle. Its entire length is twenty-five centimetres. The sponge or gauze to be used is placed upon it as bait is applied to a fish-hook. When in place, the sliding tube is slipped over the sharp point up to the sponge. Its object is to do away with the annoyance consequent upon the slipping and twisting of sponges during an operation.

Antiseptic Female Catheter.—Malcolm McLean ¹⁵⁷_{Oct.} exhibited before the Harlem Medical Association a catheter, which he devised with a view of being safe and antiseptic in the hands of physicians and nurses. It is glass, two and one-half inches long, and slightly curved. It is too short to produce any injury to the walls of the bladder. A small rubber tube is attached to the end, merely for convenience, to conduct the urine to the vessel. He has employed this instrument to empty the bladders of some 50 women, and finds its length amply sufficient.

ANÆSTHETICS.

By J. M. BARTON, A.M., M.D.,

PHILADELPHIA.

No new anæsthetics have been added to our list during the past year. Much interest is still taken in the results obtained by the Hyderabad Commission, but though these appear conclusive regarding the effects of chloroform on dogs in India, and experience shows that cardiac syncope is not to be feared in men in India, there is a strong sentiment among the profession that cardiac syncope is still to be feared in the human subject, under chloroform, in more northern latitudes. This may be owing to a difference in the subjects, on account of great dissimilarity in climates, but it is probably due to the fact that in warm countries the higher temperature volatilizes the drug more rapidly, it being impossible, for this reason, to give the patient air as strongly saturated with chloroform as in colder regions.

It was resolved at the 1890 meeting of the German Surgical Society to make a collective investigation of the cases in which anæsthesia had been induced for surgical purposes by members of the society during the period between July 1 and December 31, 1890. Sixty-six members of the society made reports of their cases, the cases reported being 24,625 in number. The anæsthetics used, according to Gurlt's ⁹⁰_{Sept.} summary, were as follow:—

| | |
|---|-----------------------------------|
| 22,656 chloroform . . . | with severe asphyxia 71, deaths 6 |
| 470 ether . . . | “ “ 0, “ 0 |
| 1055 ether and chloroform . . . | “ “ 5, “ 0 |
| 417 ether, chloroform, and alcohol . . . | “ “ 4, “ 0 |
| 27 ethyl bromide . . . | “ “ 0, “ 0 |
| <u>24,625</u> | Severe asphyxia 80, deaths 6 |

During the year, chloroform was used in St. Bartholomew's Hospital, ¹⁵⁷_{Oct.} in 1601 cases; ether, in 810; gas, in 686; gas and ether (P-1)

were used in 509. There were 2 deaths during this period. Both occurred during the administration of chloroform.

CHLOROFORM.

The Hyderabad Chloroform Commission.—On the decision of the Hyderabad Commission, that chloroform always arrested respiration before the heart, becoming known, Arthur R. Cushny ⁶_{Mar. 14} made some experiments, at the suggestion of Kronecker, in the physiological laboratory of Bern University. He states his general results as follows: “By the Hyderabad Commission no experiments seem to have been made with chloroform-vapor of ascertained concentration, and, as this factor seems to be of considerable weight, I have used an apparatus in which it could be exactly regulated. It consists of 2 bottles, one-third filled, the one with chloroform, the other with water. Part of the air inspired by the animal passes through one, part through the other, and becomes saturated with chloroform fumes or water-vapor accordingly. The proportion of the chloroform saturated to the moisture-saturated air is regulated by two graduated stop-cocks. The two currents unite, and are led by a short tube to the tracheal canula. Expiration is provided for by a small valve. In order to exclude all chance of asphyxial complications, and to allow a regular amount of chloroform to be absorbed in a given time, the air was driven through the apparatus by a machine for artificial respiration. The animals used were dogs and rabbits, and the experiments were carried out at ordinary room-temperature,—15° to 17° C. (59° to 62.5° F.).

“In rabbits, the condition of the heart, when the respiration ceased, varied with the concentration in which the vapor had been blown into the lungs; the more chloroform the mixture contained, the weaker the heart-beat. Of 17 rabbits chloroformed with saturated air, in 5 the whole heart continued to beat; in 9 one or both auricles were in rapid motion, while the ventricles were still; in 1 the left auricle alone was paralyzed, while in 1 the whole heart was in diastolic stand-still. In rabbits which were anæsthetized with a mixture of chloroform-vapor and air, the whole heart was invariably found beating, but the more chloroform the mixture contained the weaker was the heart-beat. The success in restoring spontaneous respiration depends upon the condition of the heart,

and, therefore, on the concentration in which the chloroform had been given. The essential point is, that the drug be given in sufficient dilution to avoid its action on the heart. Although I cannot agree with the Hyderabad Commission, that the heart always continues to beat after respiration ceases, yet the difficulty in maintaining the concentration necessary to paralyze the heart simultaneously with the respiration is extremely great, and I should think that in ordinary chloroform administration such a simultaneous paralysis can never occur. So long as the proportion of drug to air is kept low enough, chloroform can be used with safety. The concentration necessary to keep rabbits and dogs 'under' chloroform is respectively 4 and 8 parts chloroform-vapor (at from 15° to 17° C.—59° to 62.5° F.) to 96 and 92 parts pure air. Since, however, the concentration necessary to maintain narcosis varied in different species of animals, no inference could be made as to that necessary for men, and my results would have been incomplete had I not been enabled through the kindness of Girard and Niehaus to carry out some experiments in their operating theatre in Bern Inselspital. In these experiments, the anæsthetic was given in the same way as in my experiments, on animals, with the exception that, instead of the tracheal canula, a Y-shaped glass tube was used, the two ends fitting tightly into the patient's nostrils. Expiration was allowed through the mouth, but inspiration through it was prevented by a valved respirator. The patients, in general, did not object to the method, and one, who had to be anæsthetized again some days subsequently, begged that the apparatus might be used again instead of the mask. Narcosis was obtained in from five to twelve minutes by a mixture of 15 to 20 per cent. of chloroform, and could be kept up by continued inhalation of 5 to 7 per cent. in children and of 7 to 10 per cent. in adults. Almost no excitement occurred. Throughout the narcosis the face and conjunctiva remained red, and in several cases the concentration necessary to keep up insensibility, with retention of the corneal reflex, was maintained."

Wood, ⁶_{Nov. 29, '70} in his address on "Anæsthesia," in Berlin, stated: "If any credence is to be attached to the statements of competent witnesses who have recorded human deaths during anæsthesia, it is certain that in some cases, under the influence of chloroform, the pulse and respiration have ceased simultaneously, whilst in other

instances the respiration has failed before the pulse, and in still other cases the pulse has ceased its beat before the respiratory movements were arrested. In the dog, chloroform has a distinct, direct paralyzing influence on both respiration and circulation; that the respiration may cease before the heart-beat, or the two functions be simultaneously abolished, but that in some cases the heart is arrested before respiration. We have several times seen the respiration continue as long as one and even two minutes after the blood-pressure has fallen to zero and the pulse has completely disappeared from the carotid artery. The correctness of our experiments, we claim, must be acknowledged. I do not desire to express any doubt whatever as to the correctness of the experimental data of the Commission. I simply claim that both sets of experiments, although they have yielded different results, have been correctly and properly performed."

D. W. Buxton, ⁶_{Dec. 30, 70} who is universally regarded as an authority upon anæsthetics, thinks that deaths occur in the human subject from cardiac failure, and quotes Snow, the Glasgow committee, Wood, and "the careful research of McWilliam," in favor of such deaths occurring, and adds that, however careful the anæsthetist may be, the fact "that death has occurred in the hands of Snow and Clover proves that such events, however much they may be lessened by skill and care, cannot be reduced to a vanishing-point." McWilliam, in his experiments on animals under chloroform, found that the heart-muscle relaxed, and that dilatation took place, leading, of course, to gradual failure of the circulation. Up to a certain point this "give" of the heart-muscle was recoverable. In some cases the dilatation was sudden, and all efforts at resuscitation failed. McWilliam draws the following general conclusions: During chloroform anæsthesia the blood-pressure is lowered and the heart's action weakened. Dilatation of the heart occurs even when chloroform is given gently, mixed with abundant air. Dilatation may occur even before conjunctival reflex is abolished. It occurs often very rapidly, and is not relieved by raising the blood-pressure. Cardiac enfeeblement occurs by a sudden weakening and dilatation of the organ. Though respiration generally ceases before heart-failure occurs, sometimes heart-failure takes place long before the respiration ceases."

Mortality.—Julliard, of Geneva, ²²_{May 71} has collected the following

important statistics, comparing the mortality of chloroform and ether :—

| CHLOROFORM. | | | |
|---|--------------|---------|-------------|
| | Anæsthesias. | Deaths. | Prop. |
| Andrews, | 117,078 | 43 | 1 in 2,723 |
| Coles, | 152,260 | 53 | 1 in 2,873 |
| Richardson, | 35,165 | 11 | 1 in 3,196 |
| Ker, | 36,500 | 1 | 1 in 36,500 |
| Rendle, | 8,000 | 3 | 1 in 2,666 |
| Army Circular, | 80,000 | 7 | 1 in 1,148 |
| Baudens, | 10,000 | 1 | 1 in 10,000 |
| Nussbaum, | 15,000 | 0 | |
| Billroth, | 6,000 | 2 | 1 in 3,000 |
| Billroth, | 12,500 | | |
| König, | 7,000 | | |
| Kappeler, | 5,000 | 1 | 1 in 5,000 |
| Mills, | 4,810 | 2 | 1 in 2,405 |
| Roger Williams (Middlesex), | 208 | 1 | 1 in 208 |
| R. Williams (St. Bart.'s), | 12,368 | 10 | 1 in 1,236 |
| Lyman, | 5,860 | 1 | 1 in 5,860 |
| Julliard, | 1,000 | 1 | 1 in 1,000 |
| Académie de Médecine, | 5,200 | 1 | 1 in 5,200 |
| Anstie, | 3,058 | 21 | 1 in 145 |
| Statistiques Allemandes (Kappeler), | 7,000 | 1 | 1 in 7,000 |
| Maud Hospital, | 500 | 1 | 1 in 500 |
| | 524,507 | 161 | 1 in 3,258 |
| ETHER. | | | |
| Andrews, | 83,815 | 4 | 1 in 27,938 |
| Coles, | 92,815 | 4 | 1 in 23,204 |
| Gerster, | 10,791 | 6 | 1 in 1,798 |
| Lyman, | 16,542 | 1 | 1 in 16,542 |
| Warren, | 20,000 | 0 | |
| M. Gunn, | 13,000 | 0 | |
| Bigelow, | 15,000 | 0 | |
| R. Williams (Middlesex), | 1,050 | 1 | 1 in 1,050 |
| R. Williams (St. Bart.'s), | 14,581 | 3 | 1 in 4,860 |
| Mills, | 6,440 | 2 | 1 in 3,220 |
| Julliard, | 3,654 | 0 | |
| Bruns, | 300 | 0 | |
| Tripier, | 6,500 | 0 | |
| Dumont, | 750 | 0 | |
| Ollier, | 29,500 | 0 | |
| | 814,738 | 21 | 1 in 14,987 |

Foy²² adds the following to the chloroform list :—

| | Cases. | Deaths. |
|----------------------------------|--------|---------|
| Ker (Edinburgh), | 73,000 | 2 |
| Kidd (London), | 10,000 | 0 |
| Bardeleben (Berlin), | 30,000 | 0 |
| French Army in Crimea, | 30,000 | 0 |
| English " " | 12,000 | 1 |
| Richardson, | 15,000 | 1 |

| | Cases. | Deaths. |
|---------------------------------------|--------|---------|
| Billroth (Vienna), | 12,000 | 1 |
| Clover (London), | 3,000 | 1 |
| Federal Service (U. S. A.), | 80,000 | 37 |
| Chisholm (C. S. A.), | 10,000 | 0 |
| Hunter McGuire (C. S. A.), | 28,000 | 0 |
| Surgeon-Major Lawrie, | 50,000 | 0 |

Making a total of 877,507 chloroform administrations, with a mortality of 204, or 1 in 4301.

Gurlt⁶⁴⁷ reported to the German Surgical Congress the statistics of anæsthesia in 66 hospitals, mostly in Germany. In 22,656 cases of anæsthetization with chloroform, there were 71 cases of threatened asphyxia and 6 deaths.

Laurence Turnbull, of Philadelphia,⁶¹ read before the American Medical Association a valuable paper on anæsthetics, for which he had succeeded in collecting 39 recent deaths from chloroform, which, added to the 375 collected by him for Wood, makes, up to that time, 414 reported deaths, which is, of course, but a percentage of the number that really perished. Of the 39 recent cases, "In 5 the cause of death was syncope from chloroform, and in 13 the heart stopped first. In 10 cases the respiration stopped first, while in 4 the heart and respiration ceased at the same time. In 1 case, cyanosis, no pulse. In 12 of the cases it is not stated which stopped first."

There are 8 cases reported in the journals this year in which there were dangerous symptoms during the administration of chloroform. In 5 the respiration ceased before the pulse, and in 3 the pulse ceased before the respiration.

E. A. W. Hall, of Barabanki, Oudh,⁶ reports the case of a Hindu boy, aged 18 years, on whom he performed lateral lithotomy. During the operation the boy ceased breathing, and "fully a minute after the pulse was still beating." He was restored by continued artificial respiration.

Barrett²⁸⁵ reports a case of non-fatal syncope during the administration of chloroform for division of the internal rectus, at the Victorian Eye and Ear Hospital. The symptoms were sufficiently pronounced to require active treatment, and the reporter lays stress upon the fact that the heart stopped before the respiration. Barrett also reports a case where chloroform, given through a tracheotomy-tube, was followed by dangerous symptoms. "The boy stopped breathing, became livid, but the heart continued

to act vigorously." As the symptoms returned, the operation of removal of a papilloma of the larynx had to be abandoned. G. Horne²⁸⁵_{Jan} reports two cases with dangerous symptoms. In the one "the patient became faint, and then his breathing stopped;" in the other, the pulse stopped first, and then the breathing. Both patients recovered.

Richard W. Lloyd⁶_{Apr. 4} reports a case where the pulse ceased, though the respiration continued. The chloroform was given for the operation for the radical cure of hernia. The case appears to have been carefully observed. At Richmond, Va., a robust and healthy male, aged 28, at the end of the operation for a fibrous tumor of the head of the tibia, "ceased to breathe, though he had a very good pulse."¹⁹⁶_{July} At the same place, a male aged 35, on whom external urethrotomy was being performed, and whose pulse was good and regular, "the man's face became blanched all at once, and his respiration stopped as suddenly as if he had been decapitated." In a female, aged 40, undergoing an operation for strangulated hernia, the respiration also failed. The last 3 cases recovered with difficulty.

Deaths.—Thirty-seven deaths have been reported. In 5, the respiration was noted as having ceased before the pulse; in 8, the observation was made that the heart ceased acting before the respiration, and in 24 the point was not clearly noted. Those in which the respiration ceased first were the following: At the Blackburn and East Lancashire Infirmary, the recently injured fingers of a boy of 18 required amputation. The operation was finished, when "the breathing suddenly ceased and the lad died, apparently from mechanical obstruction of the glottis. Double pleurisy and mitral and aortic incompetence were found at the post-mortem."²_{Sept. 19} During an operation at Birkenhead, Eng., on July 15, 1891, for fibrous tumor of the patella in a male aged 44, "the pupils were observed to suddenly dilate and the breathing to become shallow." Death occurred six minutes after the commencement of anæsthesia. But 2½ drachms (8.44 grammes) of chloroform were used.⁶_{Aug. 1} At San Francisco a child of 5 years was operated on for a tuberculous sinus. "The child ceased breathing. After artificial respiration, it made twenty or thirty respirations, and then ceased to breathe."⁷⁷_{June} On March 13, 1891, at the Sheffield Infirmary, a female child was undergoing the operation of iridectomy. "Some

time after chloroform was stopped and her sensation had returned the breathing suddenly stopped." Old pleuritic adhesions were found at the post-mortem.²_{Apr. 11} At the Liverpool Northern Hospital, a female, aged 49, was being operated upon for empyema. "After a few inhalations the breath suddenly became irregular, and then ceased."²_{Mar. 28} In the following 8 cases the pulse ceased first: July, 1891, at Dublin, Ireland, a fine-looking, robust man, aged 50, was operated upon for cancer of the tongue. Chloroform was administered by Skinner's apparatus. "The man gave but two or three inspirations, when he died as suddenly as if shot through the heart. There was no sign of impeded breathing, no pallor of cheek; in fact, no warning whatever."⁶_{Aug. 1} At the Wolverhampton General Hospital, a boy of 19 was operated on for necrosis of the tibia. "The patient became livid, and the heart's action could not be felt." "Death from syncope, by action of chloroform upon the heart," was the published opinion of his attendants.⁶_{Jan. 10} At Whittlesea, Cape Colony, a boy of 17 had chloroform administered for an exploratory incision in the right hypochondrium. "The lad's face suddenly became pallid, the pulse stopped at the wrist, and the breathing became irregular and gasping. Respiration continued spasmodically for fully a minute afterward, and then ceased entirely. Death seemed to have been instantaneous from reflex paralysis of the heart."²_{Feb. 14} In June, 1891, at Newcastle, a male, aged 57, for empyema. "From the time of the operation, gradual cardiac failure supervened and the patient died without resuming consciousness."⁶_{June 18} Dunlop⁶_{Nov. 29, 90} refers to a case where a skilled chloroformist requested a young, healthy patient to count as he began the chloroform. "While the patient was counting, and when he had reached the number twenty-five, his face suddenly became pale and blanched, the pupils widely dilated, and no pulse was felt at the wrist. The young man was dead."

At Caracas,⁶⁷_{Sept. 15} a male aged 18, for a slight operation, had 40 grammes (1½ ounces) of chloroform administered. "At the moment of putting in the sutures, the chloroform being already suspended, and, without any previous warning, the pulse stopped suddenly and completely, the face became pale, and the pupils acquired an extraordinary dilatation." Every expedient known to science was resorted to in the endeavor to re-animate the movements of the heart, but all in vain; death occurred without the

heart resuming its function for a single instant. It is to be noted, however, that respiratory movements were produced during more than a quarter of an hour, each time that the body was excited by some of the stimulants used. The patient took long breaths, of a reflex order, no doubt, but which would have been sufficient, if the central organ (the heart) had not been affected, from the commencement, by a complete stoppage of its function. February 7, 1891, at the Children's Hospital, Nottingham, a girl, 1 year and 7 months old, was having a noma cauterized. "The temporal pulse became feeble, the respiration slower and sighing, with increased pallor of face. The pulse was, by this time, imperceptible, and remained so, though several voluntary gasping respirations were made." ⁶_{July 11} June 12, 1891, at the Swansea Hospital, a male, aged 45, was undergoing the removal of a sequestrum from the upper jaw. "After considerable struggling the patient suddenly became rigid, convulsive movements occurred, the face became livid, the respiration shallow, and the pulse could not be felt. He gave an occasional gasp during the next fifteen minutes and died." ²_{June 20} Twenty-four cases are reported in which it is uncertain if the heart or the respiration ceased first. In November, 1890, at the Presbyterian Hospital, Chicago, a girl of 11 years took chloroform for the removal of a mole on the neck. "The operation was practically over when, without any warning, without the administration of any chloroform for at least five minutes, the child was seized with general convulsions; she ceased to breathe; her heart ceased to beat; she gave a few gasps and was dead." ⁶¹_{Feb. 14} At the Guest Hospital, Dudley, a man, aged 46, was undergoing an operation on the arm. "In two minutes the operation had to be stopped, as the heart's action and the respiration were found to have ceased." ⁶_{Jan. 10} At St. Helena, a woman, aged 34, died who had inhaled but 3 drachms. ⁶_{Dec. 13, '90} On January 18, 1891, at Leadville, Col., a male, aged 37 years, was being operated upon for urethral stricture. "The respiration stopped, a few convulsive shudders, a few flutters of the heart, and the patient was dead." ⁶¹_{Feb. 28} At St. Helena, a boy, aged 7 years, died suddenly—"lungs diseased." ⁶_{Dec. 13, '90} On March 23, 1891, at La Crosse, Wis., a female, aged 37, was being delivered of a retained placenta. "Patient gave a gasp, and in less than two minutes was dead." ²⁸²_{June} On June 11, 1891, at the Prince Alfred Hospital,

Sydney, Australia, a male, aged 38, was being operated upon for cancer of the tongue. "Respiration ceased. Condition of pulse not noted."²_{Sept. 19} At New York, in a case of spina bifida, a child aged 2 years. "The pulse became feeble, cyanosis arose, and the child died."⁷⁷_{June} A child of 5 was being surgically treated for intestinal obstruction. "The heart stopped about the same time as the respiration."⁷⁷_{June} A member of the medical profession perished in August, 1891. He had a deep-seated abscess of the neck; it was opened under chloroform. "The operation was completed and the chloroform taken from the face, when the breathing suddenly ceased. Artificial respiration restored it, the heart continuing to beat fairly well all the time. Violent convulsions now set in, and he died in half an hour from exhaustion." (?)²_{Sept. 5} March 14, 1891, at King's College Hospital, a male, aged 28, died during the reduction of a fracture.²_{Mar. 23} August 10, 1891, Middlesex Hospital, in a case of deep abscess of the neck, a male aged 30. "Almost as soon as he was under the influence of the anæsthetic he turned pale and died."²_{Aug. 22} Under date of July 16, 1891, Jas. Hardie⁶_{July 25} speaks of 5 recent deaths occurring at the Royal Infirmary, Manchester. Two only were due to the direct effects of the anæsthetic, 2 to vomited matters getting into the larynx, and 1 to collapse after the patient had nearly recovered from the anæsthetic. Five deaths from chloroform are reported to have occurred at the Melbourne Hospital during the last year.⁶_{July 11} Two deaths are referred to, in 1 of which the chloroform was administered for the extraction of three teeth in a boy of 11 years.⁶_{Oct. 24}

Rules for the Administration of Chloroform.—Surgeon-Major Lawrie⁶_{Mar. 14} has drawn up, by request, the following authoritative rules, showing briefly the method of chloroform administration which experience, based upon Syme's principles and upheld by the Hyderabad Commission, has shown to be uniformly safe: "1. The chloroform should be given on absorbent cotton stitched into an open cone or cap. 2. To insure regular breathing, the patient, lying down, with everything loose about the neck, chest, and abdomen, should be made to blow into the cone held at a little distance from the face. The right distance throughout the inhalation is the nearest which does not cause struggling, or choking, or holding of the breath. Provided no choking or holding of the breath occurs, the cap should gradually be brought nearer

to, and eventually may be held close over, the mouth and nose as insensibility deepens. 3. The administrator's sole object while producing anæsthesia is to keep the breathing regular. As long as the breathing is regular, and the patient is not compelled to gasp in chloroform at an abnormal rate, there is absolutely no danger whatever in pushing the anæsthetic till full anæsthesia is produced. 4. Irregularity of the breathing is generally caused by insufficient air, which makes the patient struggle, or choke, or hold his breath. There is little or no tendency to either of these untoward events if sufficient air is given with the chloroform. If they do occur, the cap must be removed, and the patient must be allowed to take a breath of fresh air before the administration is proceeded with. 5. Full anæsthesia is estimated by insensibility of the cornea. It is also indicated by stertorous breathing, or by complete relaxation of the muscles. Directly the cornea becomes insensitive, or the breathing becomes stertorous, the inhalation should be stopped. The breathing may become stertorous while the cornea is still sensitive. The rule to stop the inhalation should, notwithstanding, be rigidly enforced, and it will be found that the cornea always becomes insensitive within a few seconds afterward. It is only necessary to add that the patient should be so dressed for an operation that his respiratory movements can be seen easily by the chloroformist. In the climate of India this is not difficult to manage, but it is difficult to manage in the climate of Europe; so that in this respect, and in this respect alone, the chloroformist in England is placed at a distinct disadvantage compared with the chloroformist in India. Proceeding in the above way, chloroform never produces any bad effects, and its administration, in any case which is fit for an operation, is entirely free from danger."

More recently Lawrie⁹⁰ adds: "The results arrived at by the Hyderabad Commission correspond precisely with those obtained clinically. I have now given chloroform for more than a year, on the lines indicated by the Commission, with absolute uniformity. In the human subject, as in animals, so long as the breathing is perfectly regular and the inhalation is stopped in good time, there is no danger whatever in pushing chloroform until full anæsthesia is produced. But it is excessively dangerous to administer chloroform to a struggling patient, or if the patient's breathing is irregular,

or to give it in such a way as to make him hold his breath. Hence the rule—which is now enforced here without exception—that, if the patient struggles or breathes irregularly, or holds his breath, the chloroform-cap must be entirely removed, and the patient must be made to take a breath of fresh air before the administration is proceeded with.”

Patrick Hehir, the President of the first Hyderabad Commission,⁸⁰ considers that the whole theory of safe chloroformization might be summed up in the aphorism: “Use pure chloroform, watch the respiration, and keep it regular.”

Kocher,^{836 108} the well-known Swiss surgeon, recommends that a complete narcosis be first produced with chloroform, and then ether used to the end of the operation. He sums up his experience in the following conclusions: 1. As a rule, no general anæsthesia should be produced without a careful examination and thorough preparation of the patient. 2. It is advisable, and, in many patients, necessary, to first stimulate the heart's action by the use of alcohol or other stimulant (tea). 3. Narcosis must be produced only in a horizontal position. 4. Where, from whatever cause, the preparation for the narcosis is incomplete, chloroform must not be used. 5. With heart disease or any disturbance of the heart's action which is not connected with disturbance of the respiration, ether alone should be used. 6. With diseases of the respiratory organs, in which hyperæmia of the tracheal and bronchial mucous membrane exists, ether is to be discarded for chloroform. 7. In narcosis of any considerable length, complete anæsthesia is to be produced by chloroform, and the narcosis continued by the use of small quantities of ether. 8. The air breathed must never be saturated with chloroform; fresh air must be allowed comparatively free access to the respiratory organs. 9. In lengthy operations where, from whatever cause, ether is contra-indicated, an injection of morphine, or of morphine and atropine, should always be given before the narcosis, in order to reduce the quantity of chloroform necessary. Karl Hirschberg, in Zwickau,⁶⁹ also thinks that less chloroform will be needed if morphia be injected, and that there is but little danger from chloroform with a good assistant.

Method of Resuscitation in Suspended Animation following the Administration of Chloroform.—A. E. Prince, of Springfield,

Ill., ¹_{Aug. 25} describes a ready way of practicing Nélaton's method of inversion. The patient is placed inverted upon the physician's back, with his knees flexed over the latter's shoulders and his ankles in his (the doctor's) hands. The latter now walks around the room with a springy motion to promote respiration.

Obstinate Vomiting after Chloroform Narcosis.—L. F. Lenevitch, of Gorodskain, Bolniza, in Tobolsk, Western Siberia, draws attention to the efficacy of washing out the stomach with a lukewarm solution of soda.

Chloroform Narcosis and Albuminuria.—Iakov S. Sokoloff, of St. Petersburg, ⁵⁸⁶_{Nov. 4} has investigated the influence of chloroform anæsthesia on the appearance of albumen in the urine. He observed 42 male patients who were to undergo operation under chloroform. Three had albuminuria before the narcosis, while the remaining 39 were healthy. The author found that in the latter category the inhalations were followed by albuminuria, lasting from one to fourteen days, while in the 3 cases of a pre-existing albuminuria, the proportion of albumen distinctly increased.

Chloroform and Open Flame.—R. W. Amidon, ¹_{Apr. 25} in a paper read before the New York Academy of Medicine, on the subject of the inconvenience and danger attending the administration of chloroform in the presence of an open flame, which produces violent coughing in patient, operator, and assistants, regards the effects as due to the formation of a new product, called phogene-gas.

ETHER.

Ether is growing in favor abroad, both on the Continent and in England. In a vast number of vivisections Schiff¹⁰¹_{Jan.} has never lost an animal from ether, but has had many deaths from chloroform. He is of the opinion that, in the human subject, death takes place under chloroform by cardiac syncope, and not by primary arrest of the respiratory movements. Julliard, of Geneva, ²²_{May 27} speaks in the highest terms of ether, which he has used since 1877. He was first led to use it by the death of one of his patients from chloroform during the reduction of a dislocation. He has had no accident in 3654 etherizations. Garré, of Tübingen, ⁵⁷_{Mar. 3} uses the Julliard inhaler, and obtains anæsthesia generally in four minutes. He kept one patient under ether two hours with 40 cubic centimetres (1½ ounces). In another case he used 150 cubic centimetres

(4½ ounces) in twenty-five minutes. The average amount required is 80 cubic centimetres (2½ ounces). In patients who take ether badly a hypodermatic injection of morphia and atropia before etherization promotes tranquility. Garré has never found that ether caused albuminuria. He believes that patients whose hearts are affected can take ether well, as in all his observations ether stimulated the heart. He feels easier if the patient is under ether than under chloroform, as in ether there is no sudden heart-paralysis. Children under 4 tolerate chloroform better than ether. Wise, of Geneva,¹⁰¹ claims for ether: (1) it is less dangerous than chloroform; (2) it produces as permanent and as complete anæsthesia as chloroform; (3) the inconveniences of ether, which do not pertain to chloroform in the same degree, can be reduced to insignificance or avoided by careful administration. Helwig,⁹⁹ says ether has no untoward sequelæ following its administration, for chloroform may kill after its administration is stopped, but not so with ether. In the obese, the alcoholic, the diabetic, and, in weak conditions, in operations about the head, and in those who are shocked or who have lost considerable blood, he advises ether. Sheppard,² July 11, says that in the prone or lateral position ether is to be preferred, because chloroform is a respiratory depressant, and if a patient is made to assume the prone or lateral position it may prove dangerous, as the position itself may cause asphyxia. Wright, of Brooklyn,¹ May 10, presents a new inhaler for ether. The receiver is constructed on the principle of the Allis inhaler. The lower part of the receiver serves as a reservoir to catch the ether as it runs through. The receiver has a movable cone, which allows the patient to be placed in any position.

Deaths from Ether.—McWhennell,² reports a death from ether occurring in a man, aged 46, who took ether for an operation on an overdistended bladder. "During the administration the pulse ceased and death ensued." Brown, of San Francisco,⁹ July 25, in a woman aged 41, administered ether for the removal of a fibroid of the uterus. "The heart became feeble and death followed. There were a few weak efforts at respiration, and then all was over." Tate,² May 21, in a male aged 20, administered ether for the operation of circumcision. About five minutes after the operation was completed the patient began vomiting, when suddenly he became cyanosed. The operator passed his finger into the mouth and

got out a large piece of meat, which did not relieve him. Laryngotomy was performed, but he died. At the post-mortem a large mass of partly-digested meat was found in the lower part of the trachea extending into both bronchi. At the Stockport Infirmary, England, a death occurred of a woman, aged 44, previous to an operation for cancer. "Before she was completely under the influence of the ether there was a sudden stoppage of the pulse, and death took place in less than a minute from failure of the heart's action." ²_{Jan. 10}. At the University College Hospital, London, a female aged 43 was undergoing operation for the removal of a tumor. "Her breathing became embarrassed and her pulse weak; death ensued in a few minutes." ²_{Aug. 22}. James Swain ¹³¹_{Sept.} reports the death of a man, aged 24, etherized for the purpose of having an incision made in a node on the tibia. "He took ether well, about 1½ ounces (40.5 grammes) being used. He regained consciousness in half an hour, and then turned over on his side, became blue in the face, gasped for breath, and died in two minutes."

BROMIDE OF ETHYL.

But little that is new has been written upon this anæsthetic. J. Kölliker ¹⁰¹_{Sept.} regards it as deserving of a more extended trial by surgeons than it has yet had. He states that anæsthesia by bromide of ethyl is rapidly induced,—within half a minute from the time of administration. The anæsthesia lasts from one to three minutes, and the quantity of the anæsthetic required varies from 1 to 3 drachms (3.37 to 16.43 grammes) for children and about double that amount for adults. In its administration, a closely-fitting, air-tight mask is used, a few drops being first poured on it to accustom the patient to the anæsthetic, and then the entire quantity is administered. Kölliker has thus far observed no disagreeable effects from bromide-of-ethyl narcosis, although a short period of excitement has sometimes been noticed after withdrawal of the mask. The operative procedures in which he has found this anæsthetic serviceable comprise the incision of abscesses and phlegmons, tenotomies, the application of the thermo-cautery, sequestrotomies, and the extirpation of small tumors and tuberculous glands.

Wilcox ⁹⁶_{Oct.} regards bromide of ethyl as particularly useful in children. In them narcosis is quickly and completely induced and easily

maintained. When once the patient has been completely under its influence, he may be allowed to come out; and, while apparently perfectly conscious, will lie quiet, with his eyes open, and even able to answer questions. He does not seem to feel any pain, and the last steps of an operation may be completed with the patient in a state of painless consciousness. Anæsthesia is generally complete within a minute, but the patient will come out of it almost as quickly. Usually, a few drops only are required to produce anæsthesia, and there is seldom more than 15 or 20 drops applied to the inhaler at once. The inhaler which he employs is simply a tight cap made from a newspaper and a towel, and at first the patient is allowed a few breaths of mixed air and the bromide-of-ethyl vapor. Then the cap is placed down close over the face, as with sulphuric ether. He has never noticed any particular effect on the heart's action. Vomiting is frequently produced. It has been given, usually, for short operations and for dressing painful wounds. The duration of the anæsthetic state lasts from two to fifteen minutes. He favors its use where it is necessary to produce the anæsthetic state in a child for a short time, but for adults he has not, as a rule, found it powerful enough to produce the desired effect. Merck⁵³_{Nov. 7} gives the following tests for its purity: 1. Put it on the hand. It must evaporate quickly, and absolutely without residuum, producing a marked feeling of cold. 2. The filtration with water should be neutral, and should not change on the addition of nitrate of silver. 3. The addition of concentrated sulphuric acid should cause no discoloration. If it is colored to brown or yellow, it shows that the ethylic bromide is undergoing decomposition.

NITROUS OXIDE.

Flemming²¹³_{Dec., '90} thinks that surgeons should avail themselves more frequently of this agent in short operations. He constantly employs it in the Royal Infirmary, in such cases, with the greatest comfort. Percy Edgelow⁶_{Dec. 12, '90} has introduced an improved pedal attachment for nitrous-oxide bottles, by which the anæsthetist is assured against running short of gas. He recommends the recumbent posture in patients who have an affection of the heart. In children, he advises the removal of the face-piece at the first sign of jactication.

A death from nitrous oxide is reported from Montreal. ²²⁴
A man, aged about 24, went to the office of a dentist to have a
tooth extracted. After assuring himself that the patient was not
suffering from heart or lung diseases, the dentist administered the
gas. No sooner had the tooth been extracted than the patient
fell over in the chair and expired. Artificial respiration was per-
formed, without restoring animation; the patient was not under
the influence of liquor, and five hours had elapsed since he had
last taken food; the gas was pure.

METHYLENE.

Chamberlain ⁶_{Aug. 29} reports a death under methylene. "The drug
was administered for the removal of a cancer of the breast; in
about twenty minutes the patient began to heave, as if desiring to
vomit; she breathed heavily and expired. Artificial respiration
was practiced, injections of ether and brandy given, without avail."

COCAINE.

Paul Reclus, who has had a vast experience in the use of
cocaine, having performed more than 1200 operations with its aid
without accident, finds that for mucous membranes the surface
application of cocaine is sufficient, but, if more profound anæsthesia
is desired, it should be injected hypodermatically. Panas and
Magitot, ²_{Sup. May 30} following in great part the teaching of Reclus, sum
up their conclusions as follows: 1. Cocaine is an excellent local
anæsthetic, and should not be banished from surgery. 2. The dose
should be proportional to the extent of surface that it is desired to
render insensitive. 3. Cocaine should not be employed in patients
suffering with chronic affections of the respiratory passages or those
of well-marked neurotic diathesis. 4. The patient should assume
the recumbent posture. 5. It should be given in divided doses at
an interval of some minutes.

Schleight ¹⁷⁰_{Oct.} recommends spraying the part with ether before
cocaine is used, and says that patients with a cyanotic appearance,
with sluggish circulation, bear cocaine badly. Hypodermatic in-
jections of cocaine induce phenomena of profound intoxication in
some individuals, even when small doses are employed. Nearly
three years ago Satterwhite called attention to the dangers attending
the use of even very small doses of cocaine.

A case is reported by Broughton,¹⁹ in which unconsciousness, irregular and slow respiration, and a slow, feeble pulse followed the application of 3 minims (0.19 gramme) of a 20-per-cent. solution to the cavity of a tooth. Whistler, after the application of a 4-per-cent. solution to the nasal cavity, noted vertigo and threatened syncope. In a case of glossitis, Ricket states that after the use of a similar solution the patient became moribund.

Myrtyl¹⁹ dropped 3 minims (0.19 gramme) of a 3-per-cent. solution into each eye, which immediately caused a sense of numbness in the back of the tongue and throat, palpitation, nausea, and threatened syncope. Bettelheim records that in 1 case the hypodermatic injection of $\frac{1}{8}$ grain (0.011 gramme) induced alarming symptoms; and in another $\frac{1}{8}$ grain (0.0081 gramme), similarly injected, caused unconsciousness, congestion of the face, irregular breathing, and trismus. Cotter¹⁹ found unpleasant symptoms, in more than one instance, while using a 10-per-cent. solution in the nasal cavities. The breathing became difficult, the larynx seemed paralyzed, distressing symptoms of cardiac and general depression appeared, and the patient was unable to walk for two hours. Hueber⁴⁸⁵ dropped about $1\frac{1}{2}$ minims (0.097 gramme) of a 2-per-cent. solution into the nostril of a healthy young soldier previous to the removal of a polypus; this was soon followed by an exceedingly weak pulse, a cold skin, and unconsciousness. A case is reported by Ficano,¹⁹ of a woman, aged 43, in whom a few drops of a 5-per-cent. solution was introduced into the middle ear by means of a catheter; in a short time vomiting came on, with cramps and diarrhoea, which lasted several hours; there was marked muscular inco-ordination and symptoms generally analogous to those of sea-sickness. Notwithstanding what has been said to the contrary, Reclus³⁶³ claims that cocaine anæsthesia may be obtained on an inflamed skin. He regards a 2-per-cent. solution as sufficiently strong for all purposes. With this solution there is less liability to unpleasant after-effects than when the same dose of cocaine is injected in the form of a 10-per-cent. solution. He is somewhat skeptical about the cases which have been reported of intolerance for doses of a small fraction of a grain, and asks whether sometimes nervous symptoms arising from emotional causes have not been attributed to cocaine.

Dombrowski⁸⁰ advises the "mixed narcosis," which is com-

menced by administering chloroform in the ordinary way, but in trifling quantities, the patient remaining conscious from beginning to end. After a few "whiffs" a 4-per-cent. solution of cocaine is injected, the usual dose amounting to 2 syringefuls ($1\frac{1}{8}$ grains—0.12 gramme) of pure cocaine. In protracted operations, twice this quantity is injected. The advantages claimed for the mixed anæsthesia are: 1. Only small quantities of chloroform are required. 2. Vomiting occurs but seldom. 3. The pulse remains good all through. He also advises it for making painless passive motion in ankylosed joints from stiff dressings. A. L. Elberman⁹⁰_{June} employs cocaine in operations on the urethra and bladder, and has noticed the curious fact, that while inducing complete anæsthesia of the canal and vesical cavity, cocaine always fails to produce an anæsthetic impression on the neck of the bladder.

CHLORIDE OF ETHYL.

As a local anæsthetic, Monnet⁶_{Apr. 11} has introduced a method of freezing by means of chloride of ethyl. It is hermetically sealed in glass tubes containing 10 grammes ($2\frac{1}{2}$ drachms), one end being drawn out into a fine point. When required for use, the point is broken off at the narrowest part, and the warmth of the operator's hand is sufficient to cause a very fine jet of the chloride to be projected on the part to be anæsthetized. One great advantage claimed for this method is that no apparatus is required. Redard⁷³_{June 6} reports good results with the drug, and speaks highly in its praise.

CHLORIDE OF METHYL.

Berezovsky²_{Sup., Aug. 1} says that this spray should not be applied for more than three seconds at a time. It induces anæsthesia for twenty seconds, when the application may be repeated. By its aid he has performed successfully circumcision, excision of cancer of the lip, evulsion of toe-nails, incision for empyema, and the scraping out of tuberculous ulcers and fistula.

MISCELLANEOUS.

A New Method of Producing Local Anæsthesia.—Wiesendenger⁶_{Aug. 1} describes a new method of producing anæsthesia by the application of a metallic tube or chamber which is cooled by carbonic acid. The cold may be regulated from the temperature of cold water to one sufficiently low to cauterize. The anæsthesia

lasts from one to two minutes and then disappears without any ill effects. The simple turning of a tap will regulate the stream of carbonic acid, producing any degree of temperature down to 4° F. (15.6° C.). In using this cold for the purpose of cauterizing, the surgeon has the advantage of producing anæsthesia at the same time. Kummel applied the method in the case of a boy in the Maria Hospital, at Hamburg, with such complete success that the boy looked on without moving a muscle while a deep incision of twelve centimetres in length was made in his thigh.

Local Anæsthesia Produced by Injection of Water.—C. L. Schleich⁴¹ has made experiments which demonstrate that the hypodermatic injection of simple sterilized water produces local anæsthesia of several minutes' duration. The anæsthetic area becomes the seat of a white œdema similar to that produced by the sting of a mosquito, the extent of which depends upon the quantity of water injected. The syringe and skin should first be disinfected. The pain produced is no greater than that resulting from the injection of cocaine. The needle is inserted slowly and parallel with the cutaneous surface. The anæsthesia is so complete that incisions may be made into the skin without the slightest pain.

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By N. I. MCCARTHY,
PHILADELPHIA.

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262. *Annales de l'Institut Pasteur*, Paris.
263. *American Journal of Psychology*, Worcester, Mass.
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294. Bulletin de la phthisie pulmonaire, Paris.
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298. Gazette hebdomadaire des sciences médicales, Montpellier.
299. Annales de chimie et de physique, Paris.
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314. Zeitschrift für Psychiatrie und gerichtliche Medizin, Berlin.
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321. Annales d'orthopédie, Paris.
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415. *Courrier médical*, Paris.
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433. *Concours médical*, Paris.
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589. *Riforma medica*, Naples.
590. *Wjestnik klinitscheskoj i ssudebnoj psichiatрії i neiropatologii*, St. Petersburg.
591. *Rivista sperimentale di freniatria e di medicina legale in relazione con l'antropologia e le scienze giuridiche e sociali*, Reggio-Emilia.
592. *Zeitschrift für die Behandlung Schwachsinniger und Epileptischer*, Dresden.
593. *Kjobenhavenske medicinske selskabs förhandlingar*, Copenhagen.
594. *Revista veneta di scienze mediche*, Venice.
595. *Zeitschrift für Geburtshülfe und Frauenkrankheiten*, St. Petersburg.
596. *Rivista clinica e terapeutica*, Naples.
597. *Bulletin de la Société médicale de l'Yonne*, Auxerre.
598. *Zeitschrift für Wundärzte und Geburtshülfer*, Hegnach.
599. *L'actualité médicale des sciences médicales et intérêts professionnels*, Paris.
600. *Mittheilungen für den Verein Schleswig-Holsteinischer Aerzte*, Kiel.
601. *Rivista clinica. Archivio italiano di clinica medica*, Milan.
602. *American Anthropologist*, Washington, D. C.
603. *Revue d'anthropologie*, Paris.

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605. Archivio di psichiatria, scienze penali ed antropologia criminale, Torino.
606. L'Homme, Paris.
607. Revista especial de oftalmologia, sífilografia y dermatologia, Madrid.
608. Revue internationale scientifique et populaire des falsifications des denrées alimentaires, Amsterdam.
609. Archiv für Anatomie und Entwicklungsgeschichte, Leipzig.
610. La medicina contemporánea. Revista médica de Reus.
611. Medical Current, Chicago.
612. Archivos de medicina y cirugía de los niños, Madrid.
613. Revista Balear de ciencias médicas, Palma de Mallorca.
614. Giornale di farmacia, di chimica e di scienze affini, Torino.
615. La rassegna di scienze mediche, Modena.
616. Gazzetta medica lombarda, Milan.
617. Indian Medical Journal, Calcutta.
618. Crónica médica de Valencia.
619. Revista médico-farmacéutico de Aragón, Zaragoza.
620. El monitor médico, Lima.
621. Ejenedelnaya, St. Petersburg.
622. Pester medicinisch-chirurgische Presse, Budapest.
623. Der Militärarzt, Vienna.
624. Bollettino delle malattie dell' orecchio, della gola e del naso, Florence.
625. Gazzetta di medicina publica, Naples.
626. Annales de la Société d'hydrologie médicale de Paris.
627. Mittheilungen aus der Vereins der Aerzte in Steiermark, Graz.
628. Bollettino delle cliniche, Milan.
629. La medicina preventiva; Gazzetta mensile d'igiene clinica e terapia, Naples.
630. Coimbra médica, Coimbra.
631. Minnesota Medical Monthly, St. Paul.
632. Revista de medicina y cirugía prácticas, Madrid.
633. Revista de laringologia, otologia y rinologia, Barcelona.
634. Revista médica de Sevilla.
635. Revista dos cursos practicos et theoreticos da Faculdade de medicina do Rio de Janeiro.
636. Dnevnik obshestva vrachei pri Imperatorskom Kazanskom Universitetie, Kazan.
637. Annali della Università libera di Perugia.
638. Revista médica de Bogotá.
639. Revista argentina de ciencias médicas, Buenos Ayres.
640. Kronika lekarska, Warsaw.
641. Annales de la Société de médecine d'Anvers.
642. Gazeta medica da Bahia.
643. Revue médicale, Louvain.
644. Semskij wratsch, Tchernigoff.
645. Texas Sanitarian, Austin, Texas.
646. Doctor's Weekly, New York City, N. Y.
647. Alabama Medical and Surgical Age, Anniston.
648. Journal des Sociétés scientifiques de la France et de l'étranger, Bordeaux.
649. Zeitschrift der Bakterienkunde, Leipzig.
650. Wiener medicinische Blätter, Vienna.
651. Mittheilungen aus der medicinischen klinik zu Königsberg.
652. Giornale di neuropatologia, Naples.
653. La médecine russe, St. Petersburg.
654. Revista de médico-farmacéutica, Castellón.
655. Bollettino della Poliambulanza di Milano.
656. Revista Brasileira de medicina, Rio de Janeiro.
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659. Voz de Hipocrates, Mexico.
660. Spitalul, Bucharest.
661. Annales da Academia de medicina do Rio de Janeiro.
662. Revista médico-quirúrgica, Buenos Ayres.
663. Medical Mirror, St. Louis.
664. Moniteur du praticien, Paris.
665. El progreso ginecologia y pediatria, Valencia.
666. Revista de medicina cirugía y farmacia, Barcelona.
667. Journal de pharmacie e chimica, Lisbon.

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669. *Memorie della reale Accademia medica di Genova*.
670. *Mémoires de la Société de médecine de Nancy*.
671. *Revue médicale de Moscou*.
672. *Der Fortschritt*, Geneva.
673. *Satellite of the Annual*, Philadelphia.
674. *Le mouvement hygiénique*, Brussels.
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676. *Osaka Medical Journal*, Japan.
677. *Japanese and Foreign Medical News*, Tokyo.
678. *Eira*, Stockholm.
679. *Centralblatt für Kinderheilkunde*, Leipzig.
680. *Revue Inter. de Rhinol., d'Otol., de Laryngol. et d'Ophtal.*, Paris.
681. *Mittheilungen aus der medicinischen Facultät der kaiserlich-Japanischen Universität*, Tokyo.
682. *Entomologisk Tijdskrift*, Stockholm.
683. *Novosti Terapii*, Budapest.
684. *Annales de la Société de médecine de Gand*.
685. *Bulletin de la Société de médecine mentale de Belgique*, Gand.
686. *Archivio italiano per le malattie nervose e più particolarmente per le alienazioni mentali*, Milan.
687. *Journal of the Army Medical Society*, Japan.
688. *Psychiatrische Bladen*, Amsterdam.
689. *Reports of the Psychical Research Society*, London.
690. *Bulletin de la Société de psychologie physiologique*, Paris.
691. *Revue illustrée de polytechnique médicale*, Paris.
692. *The Hospital*, London.
693. *Revue de la masso-électrothérapie*, Paris.
694. *Public Health*, London.
695. *Hospital Gazette*, London.
696. *Chirurgitcheskij westnik*, St. Petersburg.
697. *British Journal of Dermatology*, London.
698. *Chemiker Zeitung*, Berlin.
699. *Revista clinica de Barcelona*.
700. *Revue mycologique*, Paris.
701. *Zoologischer Anzeiger*, Leipzig.
702. *Közégségügy és törvényszéki orvostoi*, Budapest.
703. *Westnik obschtschestvennoj gigieny, ssudebnoj i praktitscheskoj medizini*, Moscow.
704. *Westnik oftalmologii*, St. Petersburg.
705. *Journal ophtalmologique du Nord*, Lille.
706. *Bulletin de statistique démographique et médicale de Bruxelles*.
707. *Journal de pharmacie d'Anvers*.
708. *Bulletin de la Société anatomo-pathologique de Bruxelles*.
709. *Bulletin de la Société belge de microscopie*, Bruxelles.
710. *Bulletin de la Société royale de médecine publique de Belgique*, Bruxelles.
711. *Zeitschrift für angewandte Chemie*, Berlin.
712. *Bulletins et publications de la Société de médecine du Luxembourg*.
713. *Bulletin de la Société de médecine de Reims*.
714. *Archivio Bizzozero*, Naples.
715. *Bulletin de la Société de médecine du département de la Sarthe*.
716. *Los Avisos*, Madrid.
717. *Bulletins et publications de l'Académie des Sciences de Belgique*, Brussels.
718. *Bulletin de l'Institut de Statistique*, Paris.
719. *Western Druggist*, St. Louis.
720. *Revue internationale de l'électrothérapie*, Paris.
721. *Dental Headlight*, Nashville.
722. *Jahresbericht über die Fortschritte der Geburtshilfe und Gynäkologie*, Leipzig.
723. *Index Medicus*, Detroit.
724. *Gynakologisches Centralblatt*, Berlin.
725. *Moniteur d'ophtalmologie*, St. Petersburg.
726. *Vestnik oftalmologii*, St. Petersburg.
727. *Annali dell' Istituto d'igiene sperimentale dell' Università di Roma*.
728. *Répertoire universel d'obstétrique et de gynécologie*, Paris.
729. *Transcaucasian Lying-in Hospital Reports*.
730. *Bollettino scientifico*, Pavia.
731. *Wiener medicinisches Jahrbuch*, Vienna.

732. *Rivista clinica dell' Università di Napoli*.
733. *Annales de médecine thermale*, Paris.
734. *Australian Journal of Pharmacy*, Melbourne.
735. *La médecine hypodermique*, Scéaux.
736. *Il Sordomuto*, Naples.
737. *L'Anomalo. Gazzettino antropologico psichiatrico, medico-legale*, Naples.
738. *Centralblatt für orthopädische Chirurgie und Mechanik*, Berlin.
739. *Giornale della reale Accademia di medicina*, Torino.
740. *Archiv für Wissenschaften und praktische Thierheilkunde*, Leipzig.
741. *Ephemeris*, Brooklyn.
742. *Apotheker-Zeitung*, Berlin.
743. *Het Maandblad voor Apothekers*, Amsterdam.
744. *Pharmaceutical Journal and Transactions*, London.
745. *Zubovrathebnyi Vestnik*, St. Petersburg.
746. *Bulletins des travaux de la Société de pharmacie de Bordeaux*.
747. *L'Union pharmaceutique*, Paris.
748. *Fortschritte der Krankenpflege*, Bern.
749. *Bulletin de la Société d'anthropologie de Paris*.
750. *Giornale fiorentina d'igiene*, Florence.
751. *Bulletin de la Société de biologie*, Paris.
752. *The American Doctor*, Richmond, Virginia.
753. *Deutsche Zeitschrift für praktische Medizin*, Berlin.
754. *Wojenno Ssanitasnoje*, St. Petersburg.
755. *Archives générales d'hydrologie, de climatologie et de balnéothérapie*, Paris.
756. *Fort Wayne Journal of Medical Science*.
757. *Giornale di clinica, terapia e medicina pubblica*, Naples.
758. *Časopis lékařů českých*, Praz.
759. *American Journal of Chemistry*.
760. *Times and Register*, Philadelphia.
761. *Beiträge zur klinischen Chirurgie*, Tübingen.
762. *Archivio italiano di pediatria*, Naples.
763. *Archives de Sociologie*, Paris.
764. *Johns Hopkins Hospital Bulletin*, Baltimore.
765. *La salute pubblica*, Perugia.
766. *Studies in Clinical Medicine*, Edinburgh.
767. *La medicina practica*, Madrid.
768. *Beiträge zur pathologischen Anatomie und zur allgemeinen Pathologie*, Jena.
769. *Dominion Dental Journal*, Toronto.
770. *Meditzinskoie Pregléd*, Budapest.
771. *Journal of the Respiratory Organs*, New York.
772. *La Sicilia médica*, Palermo.
773. *Revista de ciencias médicas*, Havana.
774. *Boletin de medicina y cirugia*, Madrid.
775. *Mittheilungen der naturforschenden Gesellschaft in Bern*.
776. *Journal of Ophthalmology, Otology, and Laryngology*, New York.
777. *Szemézet*, Budapest.
778. *Nordisk ophthalmologisk Tijdschrift*, Copenhagen.
779. *North American Practitioner*, Chicago.
780. *Annales de la Polyclinique de Bordeaux*.
781. *L'odontologie*, Paris.
782. *Journal d'électricité médicale*, Paris.
783. *Nowiny lekarske*, Posen.
784. *Revista médica de México*.
785. *El tula médica de Valladolid*.
786. *St. Louis Clinique*.
787. *Lehigh Valley Medical Magazine*, Easton, Pa.
788. *Il progreso de gynecologia y pediatria*, Madrid.
789. *Le progrès dentaire*, Paris.
790. *Nederlandsch Tijdschrift voor Verloskunde en Gynæcologie*, Haarlem.
791. *Γαληνός' Ἀθήναι*.
792. *El Estudio*, Mexico.
793. *Journal of the Quekett Microscopical Club*, London.
794. *Memorie della reale Accademia delle scienze dell' Istituto di Bologna*.
795. *La cellule*, Brussels.
796. *Archives de zoologie expérimentale et générale*, Paris.
797. *Alger médical*, Algiers.
798. *Revue mensuelle des maladies des yeux*, Paris.
799. *Zeitschrift für Ethnologie*, Berlin.

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801. Kansas Medical Journal, Topeka.
802. Lo spallansani, Rome.
803. Internationale Monatsschrift für Anatomie und Physiologie, Leipzig.
804. Monatsschrift des Vereins deutscher Zahnkünstler, Leipzig.
805. Dental Cosmos, Philadelphia.
806. Archives of Surgery, London.
807. Journal für Zahnheilkunde, Berlin.
808. International Dental Journal, Philadelphia.
809. American Journal of Dental Science, Baltimore.
810. Quarterly Journal of Microscopical Science, London.
811. Toledo Medical and Surgical Reporter, Toledo, Ohio.
812. Biologiska föreningens förhandlingar, Stockholm.
813. Mississippi Med. Monthly, Meridian.
814. Merck's Bulletin, New York.
815. Sanitary World, London.
816. Bollettino della Società fiorentina d'igiene, Florence.
817. Canada Health Journal, Ottawa.
818. Journal of British and Foreign Health Resorts, London.
819. La terapia moderna, Rome.
820. La medicina popular, Barcelona.
821. Revista médico-quirurgica, Cadiz.
822. Southern Dental Journal, Atlanta.
823. Archivio della riforma medica, Naples.
824. Journal des maladies cutanées et syphilitiques, Paris.
825. Annales des sciences psychiques, Paris.
826. Notes on New Remedies, New York.
827. Le mercredi médical, Paris.
828. Untersuchungen aus dem physiologischen Institut der Universität, Halle.
829. Pharmaceutical Journal of New South Wales.
830. Rivista internazionale d'igiene, Naples.
831. Revista de higiene y policia sanitaria, Barcelona.
832. Sborník lékařský, Praze. Archives bohêmes de médecine.
833. L'anthropologie, Paris.
834. La psichiatria, Naples.
835. Revista de medicina dosimetrica, Madrid.
836. Annalen der Physik und Chemie, Leipzig.
837. Zeitschrift für Nahrungsmittel-Untersuchungen und Hygiene, Vienna.
838. Duodecim, Helsinki.
839. Bollettino della Società Lancisiana, Rome.
840. Bulletin de la Société impériale des naturalistes, Moscow.
841. British Journal of Dental Science, London.
842. Journal of the British Dental Association, London.
843. Journal de médecine pratique, Paris.
844. Oesterr-ungar. Centralblatt für die medicinischen Wissenschaften, Vienna.
845. Medical Magazine, Lahore, India.
846. Harper Hospital Bulletin, Detroit.
847. Der oesterreichische Sanitäts-Beamte, Vienna and Berlin.
848. Mémoires couronnés et autres mémoires publiés par l'Académie royale de médecine de Belgique, Bruxelles.
849. Memphis Journal of the Medical Sciences.
850. Northwestern Medical Journal, Minneapolis.
851. Wojenno meditzinskij shurnal.
852. Laitopisj chirurgitscheskago obschtschestwa, Moscow.
853. Revue d'orthopédie, Paris.
854. Centralblatt für allgemeine Pathologie und pathologische Anatomie, Jena.
855. Bacteriological World, Battle Creek, Mich.
856. Western Medical and Surgical Reporter, St. Joseph, Mo.
857. Anales de la Asistencia Publica, Buenos Ayres.
858. Johns Hopkins Hosp. Rep., Baltimore.
859. Bolnitchnaja gazeta Botkina.
860. Revue générale des sciences pures et appliquées, Paris.
861. Oesterreichische aerztliche Vereinszeitung, Vienna.
862. Bulletin médical de l'Algérie.
863. Der Kinder-Arzt, Berlin.
864. American Medical Journal, St. Louis.
865. Bulletin de la Société français de dermatol. et desyphiligraphie, Paris.

866. Review of Insanity and Nervous Disease, Milwaukee, Wis.
867. Kowalewskij's Archiv.
868. Al-Shifa, Cairo.
869. American Chemical Journal, Baltimore.
870. Balneologisches Centralblatt, Leipzig.
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872. Farmacia moderna, Madrid.
873. Il faro médico, Milan.
874. Gazette des Hôpitaux de Toulouse.
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876. L'idrologia e la climatologia medica, Florence.
877. Klinicheskij sbornik gositalnoi terapevticheskii kliniki imperatorskago Varschavskago Universiteta. Nabloudeniya i izsledovaniya, Warsaw.
878. New England Medical Gazette, Boston.
879. Revue d'hygiène thérapeutique, Paris.
880. Zeitschrift für analytische Chemie, Wiesbaden.
881. Zeitschrift für Fleisch-und Milchhygiene, Berlin.
882. Wiadomosci farmaceutyczne, Warsaw.
883. Diario del San Benedetto in Pesaro.
884. Tidskrift i militär Helsovård, Stockholm.
885. Sanitarnoe Dielo. Organ obchestvennoi i chastno higienij, St. Petersburg.
886. Rassegna critica internazionale delle malattie del naso, gola e orecchio, Naples.
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896. Journal de médecine et de pharmacologie de l'Algérie, Algiers.
897. Zeitschrift für Psychologie und Physiologie der Sinnesorgane, Hamburg.
898. Toledo Medical Compend, Toledo, Ohio.
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900. Rivista generale italiana di clinica medica, Pisa.
901. Medical Times and Gazette, London.
902. Journal für praktische Chemie, Leipzig.
903. Schweizerische Wochenschrift für Pharmacie, Schaffhausen.
904. Bulletin de la Société impériale et centrale de médecine vétérinaire.
905. Magazin für Thierheilkunde.
906. Der Thierarzt, Wetzlar.
907. Revista clinica de los hospitales, Madrid.
908. Bulletin de la Société de chirurgie, Paris.
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911. New York Journal of Gynecology and Obstetrics.
912. Dental Record, London.
913. Archivio per l'anthropologia e la etnologia, Florence.
914. Journal of Electro-Therapeutics, New York.
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916. Comptes rendus hebdomadaires des séances de l'Académie des sciences, Paris.
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918. Archivos internacionales de laringologia, otologia, rinologia, Paris.
919. Deutsche Revue, Breslau and Berlin.
920. Anales de la real Academia de medicina, Madrid.
921. Boletín de medicina naval, Madrid.
922. Correspondenzblatt der Aerztekammer und der Aerztevereine der Provinz Brandenburg und des Stadtkreises Berlin.
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927. *Comptes-rendus hebdomadaires des séances et mémoires de la Société de biologie*, Paris.
928. *Studies from the Laboratory of Physiological Chemistry*, Sheffield Scientific School of Yale College, New Haven, Conn.
929. *Repertorio medico-farmacéutico y de ciencias auxiliares*, Havana.
930. *L'Ingegneria sanitaria*, Torino.
931. *Gaceta sanitaria de Barcelona*.
932. *Journal der pharmacie von Elsass-Löthringen*, Strassburg.
933. *Onderzoekingen gedan in het physiologisch Laboratorium, der Leidse Hoogeschool*, Leiden.
934. *Rivista italiana di terapia e igiene*, Piacenza.
935. *Andalucfa médica*, Cordova.
936. *Bollettino della Associazione medica lombarda*, Milan.
937. *Revue biologique du nord de la France*, Lille.
938. *Onderzoekingen gedan in het physiologisch Laboratorium der Utrecht'sche Hoogeschool*, Utrecht.
939. *Revista de enfermedades de la infancia*, Barcelona.
940. *L'Orosi. Giornale di chimica*, Florence.
941. *Journal de pharmacologie*, Bruxelles.
942. *Gazette médico-chirurgicale de Toulouse*.
943. *Annali di ostetricia e ginecologia*, Florence.
944. *Bollettino dell' Associazione nazionale dei medici comunali*, Rome.
945. *Bulletin de pharmacie de Lyon*, Lyons.
946. *Journal de la santé publique*, Paris.
947. *Bollettino farmaceutico*, Rome and Milan.
948. *California Medical Journal*, San Francisco.
949. *Chemisches Centralblatt*, Leipzig.
950. *Maandblad tegen de vervalschingen*, Amsterdam.
951. *Medicina científica basada en la fisiología y en la experimentación clínica*, Mexico.
952. *Revista farmacéutica*, Buenos Ayres.
953. *Pharmaceutische Zeitung*, Berlin.
954. *Nederlandsch militair geneeskundig Archief van de Landmacht, Zee-macht, het Oost- end West- Indisch Leger*, Leiden.
955. *Archives néerlandaises des sciences exactes et naturelles*, Haarlem.
956. *Bollettino del manicomio provinciale di Ferrara*.
957. *Gazzetta delle cliniche*, Naples.
958. *Archiv für öffentliche gesundheitspflege in Elsass-Löthringen*, Strassburg.
959. *Revue d'hypnologie théorique et pratique*, Paris.
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961. *Organ der Taubstummen-Anstalten in Deutschland und den deutschredenden Nachbarländern*, Friedburg.
962. *Bollettino della reale Accademia medico-chirurgia di Napoli*.
963. *Corréo médico castellano*, Salamanca.
964. *Gazzetta del manicomio della provincia di Milano in Mombello*.
965. *Wochenschrift für Thierheilkunde und Viehsucht*, Munich.
966. *Physio-Medical Journ.*, Indianapolis.
967. *Ny pharmaceutisk Tidende*, Copenhagen.
968. *Monthly Sanitary Record*, Columbus, O.
969. *Kriegerheil. Organ der deutschen Vereine zur Pflege im Felde verwundeter und erkrankter Krieger*, Berlin.
970. *Journal da Sociedade pharmaceutica lusitana*, Lisbon.
971. *Il manicomio moderno. Giornale di psichiatria*, Nocera Inferiore.
972. *Gyógyszerészi hetilap*, Budapest.
973. *Fraternidad médico-farmacéutica*, Alicante.
974. *Il monitore terapeutico. Raccolta mensile di rimedi nuovi e ricette*, Naples.
975. *Bollettino della Società d'igiene della provincia di Reggio Calabria*.
976. *Cronaca del manicomio di Ancona*.
977. *El progreso medico*, Habana.
978. *Freies hygienisches Blatt*, Vienna.
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